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The Public Works of India.

THE subject of the public works of India is one of extreme interest. To the statesman the questions of communication and transit, which are dependent, in countries like India, almost entirely on the engineer, are scarcely more important than are those of the docks and harbours which ensure maritime intercourse; or those of the dams, canals, tanks, and other works for the maintenance of water supply, which, in a distant antiquity, were conducted with far more labour and audacity than is now the case. We may hesitate to say with more skill, as we know nothing of the failures which formed part of the education of the early engineers. But no modern effort has appointed such mighty tasks as those accomplished by the ancient monarchs of the East, in Africa as well as in India.

It is comparatively a very small portion of his work recently published*, that Mr. Thornton has devoted to the subject most cognate to our pages, that of actual description of public works, or of any of those special conditions that give their peculiar complexion to the public works of India. These are roughly distributed under the heads of communications, irrigation, and miscellaneous works. The chapter on establishments might be regarded as a useful supplement, as showing in what manner public works are conducted. But land tenure and national education are topics so foreign to the proper occupation of the engineer, that we cannot but regret that they have been allowed to occupy space to the exclusion of much that we should have been glad to learn as to the work of the engineer in India.

That portion of engineering which brings the daily life of India into the most intimate union with that of Great Britain is, of course, the telegraphic system. As to this, it would have been desirable to have more than the three pages which contain all that Mr. Thornton has to tell us on the subject. At the end of 1873, India was reticulated by nearly 16,000 miles of electric telegraph, laid at a cost of 170*l.* per mile, and having cost the sum of 2,730,000*l.* As to the connection of this system with England we are told nothing, excepting that the Indian Government owns a submarine cable laid down from Kurrachee to Faó, at the head of the Persian Gulf, and a wire carried on iron standards along the Mekran coast from Kurrachee to Gwadur, and thence to Jask. A line from Jask to Teheran is held under an agreement with the Persian Government, connecting the Mekran coast and Persian Gulf lines with the Russo-Persian line of the Indo-European Company. To this scanty information should have been added, that the British-Indian Submarine Telegraph Company has two submarine cables; one of 1,463 miles in length, from Suez to Aden, and one of 1,820 miles, from Aden to Bombay. This company also owns two land lines, between Alexandria and Suez; one going *viâ* Cairo, 224 miles in length, and the other *viâ* Benha and Zagazig, of 230 miles; making a total of 3,737 miles. From Alexandria to Malta, the Anglo-Mediterranean Telegraph Company owns two cables, measuring together 1,900 miles. Three lines branch from Malta; one leading through Italy, one *viâ* Marseilles, and one almost entirely submarine. The last is that of the Falmouth, Gibraltar, and Malta Telegraph Company, which owns four cables; namely, one from Porthcurno, near Penzance, to Lisbon, of 824 miles; one from Lisbon to Gibraltar, of 331 miles; one from Gibraltar to Malta, of 1,120 miles; besides a branch called the Villa Real line, of 155 miles; the total being 2,430 miles. The aggregate capital of these three companies amounts to the sum of 2,377,500*l.* The total length of line, including the branch of 155 miles above mentioned, being 8,067 miles.

The length of the Government Indo-European cables is not given by Mr. Thornton. It is as follows:—From Kurrachee to Gwadur, 268 miles; Gwadur to Jask, 291 miles; Jask to Bushire, two cables, 105 miles; Bushire to Faó, 157 miles; total, 1,721 miles. The Anglo-Mediterranean Company paid 15 per cent. per annum in 1871; the British-Indian Submarine Telegraph Company, 7½ per cent.; the Falmouth, Gibraltar, and Malta Telegraph Company, also 7½ per cent. It will be observed that the two more distant lines have cost respectively 313*l.* and 317*l.* per mile, and the better-paying Malta and Alexandria line only 226*l.* per mile.

In 1873, we learn from Mr. Thornton, the expenses of the telegraphic establishment of the Indian Government were 247,000*l.*, and the returns only 172,000*l.*, showing a loss of about 75,000*l.* Of course, the advantage to the country is not to be measured by a comparison like this. Of the 726,341 messages sent in 1873, only 100,612 were official. The remainder measure the commercial and industrial activity of this mighty engine of progress, 66 per cent. of these private messages being commercial, and 34 per cent. of a social or personal character. As to the class of people using the telegraphs, 55 per cent. were Europeans, and 45 per cent. natives. Information of that kind is of much value. We may add, on the authority of Sir James Anderson's statistical report, that while in Italy 8·7 telegrams are despatched for every 1,000*l.* of exports and imports, in British India, for the same amount of business, only 0·4 telegrams were sent in 1869 and 1870, and 0·6 in 1871. The comparison may show what is to be expected from the development of Indian telegraphy.

The necessity of using iron standards, owing to the destruction of wood by the white ants, is mentioned by Mr. Thornton, who adds that the wire used in India is more than one-fifth of an inch in diameter, or nearly twice the weight usual in this country. The latter increase of cost, we believe, is due to the monkeys. These creatures amuse themselves by swinging on the wires, which have thus to be made monkey-proof.

For the lighting the coasts of India we are referred to a remark by Mr. Markham, to the effect that it is not even in so complete and satisfactory a state as that of Spain or of Greece. The map is of value in this respect, as it indicates the position of some thirty-six lighthouses, with the limits of their radiation. But it would have been acceptable to have a little more information on this very important subject.

As to harbours, we have reference to two first-class harbours; namely, that of Bombay on the western coast, and the river harbour of Calcutta, on the eastern coast. There is nothing that can be called a description of either. Kurrachee, two miles westward of the Ghisri mouth of the Indus; the little-used harbours of Poshetra and Seraya, in the Gulf of Cutch, and of Chud Bunder, in the Gulf of Cambay; Broach and Surat, at the mouths of the rivers Nerbudda and Sapta; Jygurh and Viziadrog, some 120 miles south of Bombay, are merely named. Carwar is indicated as a point where Mr. Abernethy has recommended the formation of a breakwater, by means of which a quiet harbour of four square miles in area might be formed, in lieu of the actual small cove, with a hard bottom.

Cochin, a few minutes north of the tenth degree of north latitude, is capable, we are told, on the authority of Mr. Robertson, of being made the finest harbour in India, by the construction of groynes, of 3,000 ft. and 2,300 ft. respectively in length. The entrance is said to be likely to secure a depth of from 20 ft. to 21 ft. at low-water spring tides. Within will be room for the mooring, in tiers, of fifty ships of 700 tons each. But by dredging in the backwater an area is to be obtained which would form a wet dock of greater extent than all the docks in Great Britain put together. The expenditure of the small sum of 75,000*l.* on the harbour, and the more formidable, but truly economical, outlay of some three-quarters of a million for railway communication with Madras, are required to provide southern India with a new Liverpool and Birkenhead combined at Cochin.

The Mudbanks of Narrakal and Allipey, one five miles north, the other forty miles south, of Cochin, form natural breakwaters, under shelter of which vessels may lie in perfect safety during the bad monsoon, in 20 ft. of water, without any strain on their cables. The existence and properties of these banks, according to Mr. Robertson, have been known for 200 years, and it is extraordinary that these advantages have not been more generally appreciated.

* Indian Public Works and cognate Indian Topics. By W. T. Thornton, C.B., Secretary for Public Works in the India Office. London: Macmillan. 1875.

Along the whole western coast of India, from Cape Comorin to Calcutta, there is not, says Mr. Robertson, a single spot where large vessels can be sheltered in all weathers. It was anticipated by Sir C. Trevelyan, in 1859, that Cocanada would become a flourishing port. But further experience shows that the Godavery brings down such quantities of silt, that Cocanada Bay is actually a delta in course of formation. A similar action on the part of the Mahanuddy, however, by forming a long island parallel with the mainland, promises to protect a channel which will prove to be the most sheltered harbour on the east coast of India, and of incalculable value in the development of Orissa.

At Madras, a close harbour is about to be constructed, "after designs by Mr. Parkes, whose well-earned reputation, based on his brilliant success at Kurrachee, justifies considerable confidence in any proposals of his of the kind." "It is to be formed by two parallel piers, 24 ft. thick, 3½ ft. above high-water level, and 1,000 yards apart, projecting 830 yards from the beach, and having arms at their extremities curving inwardly, and leaving between them an entrance 150 yards wide. An area of about 170 acres will be thus inclosed, in which from sixteen to forty-eight ships can be safely sheltered in any weather short of a decided hurricane. It is calculated that the saving of cost to vessels bound for Madras will amount to 2s. a ton in cost of landing and shipping.

The chapter on irrigation is the most interesting part of the book, and leads us to regret that Mr. Thornton should not have confined his attention to subjects on which, from his official position, he could have given so much useful information. Even in literary style we seem here to meet with a different, and a far more acceptable writer, than we have had to follow in the speculative chapters. The vast peninsula of India is divided, we are told, by De Brandis, into seven hygrometric regions, but two of which have a perfectly abundant and reliable water supply provided by nature. These appear to be, if we follow Mr. Thornton's map, rather than his text, the exterior and interior river valleys and basins that lie parallel to the southern range of the Himalaya mountains, the outlets of which, turning to the south, pour into the Arabian Sea and the Bay of Bengal the mighty and many-mouthed floods of the Indus, the Ganges, and the Bramaputra. The basin of the Irawaddy partakes of a similar hydraulic character, although the course of this river and its affluents trends directly towards the equator.

These vast streams, fed by the melting snow of the Himalayas, are at their full at Midsummer, and at their lowest in what is, elsewhere, the fullest season. The periodical rise of the Indus, Mr. Thornton says, "is exceedingly variable, scarcely ever beginning or ending at the same time in two consecutive years, and exhibiting a difference in height of 2 ft., and sometimes even of 5 ft., in corresponding months." Throughout India, "nothing can be more variable than the aspect of Indian rivers at different seasons. In spring and early summer, when swollen by melted snow from the mountains, or by the deluging monsoon rains, the smallest become furious torrents, rising to an extraordinary height wherever confined between high banks, and spreading far and wide over the country on both sides wherever they can find an outlet. After the rains, the largest dwindle into rivulets which are everywhere fordable, and over which in many places a child might step dry-footed. The Indus, Ganges, and Bramaputra are almost the only exceptions to this rule; and even the Indus, which in July rises to a height of 50 ft. between Attock and Kalabagh,"—this is just below the *débouchure* into the narrowed valley of the Indus of the drainage of the Khyber Pass,—"cannot six months later be navigated without difficulty by boats of more than 2 ft. draught."

The main difference between the systems of valleys and plains watered by the rivers which derive their water from the Himalaya, and the other great river districts of India, such as that of the Cauvery, which has a course of 700 miles, running from within fifty miles of the shore of the Arabian Gulf until it flows into the Bay of Bengal, is due to the perennial supply afforded by the stupendous range of the giant mountains. A little sooner or a little later, a few feet higher, or a few feet lower, the summer floods are certain to come down. It is therefore possible, in these districts, by adequate irrigation works, to secure abundant water supply, and ample crops. Where the feeding-grounds and catch-water areas from which the rivers descend lie, on the other hand, in districts of which the rainfall is uncertain, no irrigation works can prove adequate barriers against occasional excessive droughts, and consequent failure of crops. This is an obvious truth, when once pointed out; and Mr. Thornton deserves gratitude for calling attention to it. Thus while the *delta* of the Mahanuddy, the *delta* of the Ganges, and the lower part of the Gangetic valley have a yearly rainfall of from 60 in. to 75 in., the rainfall throughout Sind, and in one-half of the Punjab, is less than 15 in. In Central India, and the east coast of the Madras Presidency, the fall varies from 30 in. to 60 in. It is thus evident that an amount of water might be used for irrigation in wet years very far exceeding that obtainable in dry years, even in districts where absolute drought might be prevented by the forethought and skill of the engineer. Thus "in 1853 the land revenue of Sind was only 284,000*l*., whereas in 1854 it rose to 351,000*l*., the explanation of the increase being simply that the greater rise of the river permitted more water to flow into the canals in the one year than in the other."

The brief notice of the Ganges Canal, partially finished in 1854, under the direction of Sir Proby Cautley, leads the reader to wish for a detailed description of this noble work. Mr. Thornton tells us that it has a main channel 348 miles long, primary branches of 306 miles, and minor distributaries of more than 3,000 miles in aggregate length: in one place it is carried, by an aqueduct of fifteen arches, of 30 ft. span each, over a river 920 ft. broad, and thence for nearly three miles along the top of an embankment 30 ft. high. The area over which it diffuses irrigation is 320 miles long by about 50 broad.

The Jumna Canals, constructed by order of Shah Jehan, of which the easternmost became choked and useless about the middle of the eighteenth century, and the westernmost long before, were re-opened, between 1823 and 1843, by the labours of the Bengal engineer officers, Colonel Colvin, Sir William Baker, and Sir Henry Durand. These works supply water to an area of 350,000 acres.

Under the direction of Sir Henry and Sir John Lawrence was undertaken a great work, which is now rapidly changing the aspect of the Baree Doab, the one of the five doabs or tongues of land, formed by the five rivers from which the Punjab derives its name, which lies between the rivers Beeas and Ravee. Leaving the latter river just below the spot where it issues from the lower Himalayas, and passing by the famous city of Umritsur, this canal runs through a desert of hard clay, overgrown with tamarisk, to rejoin the Ravee after a course of 140 miles. With branches to Kussoor, Sobraon, and Lahore, the aggregate length, exclusive of minor distributories, will be 357 miles. The breadth and depth of the principal channel are 120 ft. by 4 ft. 9 in. These dimensions are reduced, after the divergence of the Kussoor branch, to 92 ft. by 5½ ft.; and after that of the Lahore branch to 68 ft. by 4½ ft. The water is taken from the Ravee by a cutting through a solid bank of stone of two miles in length. From this head, and from some subsidiary sources, a supply is obtained of 3,000 cubic feet of water per second. Five hundred cubic feet of water per second is allowed to each of the three main branches, reducing the flow of the main canal, after the fifty-fifth mile, where the Lahore branch breaks off, to a flow of 1,500 ft. per second, *minus* the evaporation suffered in bringing the stream to that point. The area to be watered by this system is 650,000 acres.

The irrigation of Tanjore, after the design of Sir Arthur Cotton, of the Madras Engineers, is another noble work, the details of which must be of extreme value to the engineer. The river Cauvery, not long before entering Tanjore, is divided by the island of Seringham into two branches, of which the northern takes the name of the Coleroon, while the southern retains that of the Cauvery. Forty years ago, when Sir Arthur Cotton was appointed to the post of chief engineer in Tanjore, he found that the Coleroon, which had a more direct course and a more rapid fall than the Cauvery, was rapidly deepening its bed, and robbing the sister river of more and more of its supply, so that the latter gave signs of being about to be entirely silted up. Sir Arthur constructed a dam at the western end of Seringham, by which he regulated the proportionate flow of the two streams. The success of this, and the subsidiary works, was complete. The cultivation of the province at once took a fresh start. During the next sixteen years the area of cultivation was largely extended. At least 50,000 additional acres were brought under tillage. The average produce per acre was increased by one-eighth; and the land revenue of the Government was increased by the sum of 70,000*l*. per annum, or from 430,000*l*. to 500,000*l*.

Colonel Cotton next turned his energy to the irrigation of Rajahmundry, a thinly-inhabited and poorly-cultivated district, through which the river Godavery takes the last hundred miles of its course. There he brought under irrigation 265,000 acres; turned the district into a luxuriant garden, and nearly doubled the average produce per acre.

The banks of the Godavery, Mr. Thornton tells us, had been raised above the level of the adjoining plains by the continued deposit of silt. Across this river-formed embankment, which varies in height from 6 ft. to 24 ft., is thrown an enormous dam,—or annicut, as it is called in the locality,—two miles and a half long, 130 ft. broad at the base, and 12 ft. high, revetted by masonry, if we understand a description which is not altogether clear, of 4 ft. in thickness. A level platform of 19 ft. wide, parallel, we take it, to the course of the river, is bordered by an inclined plane of 28 ft. wide, forming an overflow weir, supported by an apron of massive stone, on which the stability of the whole fabric depends. The river behind the dam is converted into the head-water of a canal, which supplies some 800 or 900 miles of artificial channel. The area already watered by this system is nearly 800,000 acres, which will be raised to a million by the time that the works are complete. In the Kistna *delta*, to the south of the valley of the Godavery, works of a somewhat similar nature are now in progress.

It is highly desirable that a full technical account of these important works should be brought within the reach of the English reader. What Sir Arthur Cotton has done in Madras, what Colonel Colvin and his colleagues have done in Bengal, what Sir John and Sir Henry Lawrence have done in the Punjaub, what Sir Proby Cautley has done in the valley of the Ganges, has yet to be done, on a smaller scale, in many a river valley of the United Kingdom. It is true that we have not those Heaven-sent oceans of water here to restrain from causing devastation, rather than fertility. It is true that we have not the brazen heaven, iron soil, and stifling heat of India to compel us to turn to wise account the treasures heaven pours from its bosom on our hill-tops. But it is also true that a neglect, as general, if not as disastrous, of the mode of economically employing our rainfall, as that which has allowed, in India, the mighty works of former rulers of the country to fall into decay, is the rule, with, but few exceptions, in this country. Our irregular climate gives us, in some years, a distribution of water over our crops, without cost to ourselves. Relying on the caprice of nature, we have, as a people, utterly neglected that intelligent and economic engineering which would enable so large a portion of the country, come wet, come dry, to treble the amount of its actual produce.

We have left ourselves no space to discuss Mr. Thornton's chapter on "Communications." With his views as to the narrow gauge we are disposed to agree. As to the method of raising capital for Indian works, we speak with more hesitation, but cannot feel that he has proved his case. Direct Government action, which he seems to recommend, is, as far as our experience goes, the most costly of all methods of executing public works. So again, when he argues that common roads should precede railways in unopened districts, we think he is but little aware of the rapidity, ease, and economy with which a light line of small gauge can be laid down,—when the object is to save time, art, and labour; and of the immense advantage, in speed as well as in hauling power, that the use of even a slight temporary way gives to the constructor of a railway. The same must apply to those who wish to use a line for traffic. On this point, however, as on most of those treated in the book, a pint of experience is worth a bushel of argument. We wish Mr. Thornton, or some other author, would present us with an exhaustive collection of those facts on which alone it will be possible to base a sound judgment as to the future of our public works in India. A good readable description of the public works of the former rulers of India; of the attempts, the successes, and the failures of European engineers and architects in that country; and of the

physical facilities and difficulties, as well as of the requirements, of the country, has yet to be written. Such a work would possess extraordinary interest.

THE "EMPEROR" BELL.

"What in the foundry-pit's deep abyss
Our hands with help of fire found,
High in the belfry of the tower
Our work to mankind wide will sound."
Schiller's Lied von der Glocke.

THIS famous new bell, which is to be hung in the southern tower of Cologne Cathedral, now rapidly reaching completion, after the impulse given at the close of the Franco-German war, is cast from French guns captured during that campaign, presented by the German Emperor to the committee charged with the work of completing that cathedral.

The bell has been cast at the machine works (to which is attached a bell-foundry) of Herr Andreas Hamm, at Frankenthal, an industrial town of the Palatinate; and it was only after two failures, and after untold anxiety and care, that he was able to produce the work which will hand down his name to posterity. It should be mentioned here that the first casting took place on August 19, 1873; the second, on November 13 of the same year; the third and successful cast was made on October 3, 1874.

Before describing his handiwork, let us have a look at its cradle. On entering the machine-works, we notice on the right the casting-pit, nearly 10 ft. deep, 20 ft. long, and 16½ ft. broad, with the temporary belfry, and a strong framework, to which the gin for raising the bell from the pit is secured. On the left is the furnace, separated from the casting-house by a wall. In the latter is an opening, permitting the running in of the molten bell-metal into the mould. The usual mode of casting bells had to be somewhat departed from, probably on account of the huge size of the new bell; and we subjoin the following account of the difficult process.

In the pit a hollow core of brickwork was first erected; this received a coating of loam, and the whole was then smoothed by means of careful gauging until the exterior of the core presented the same dimensions and form as the intended bell. On this core, the so-called "false bell," or "model bell," was formed, also of loam. It had to be the exact counterpart of the real one; it received the same decorations and the same inscriptions, made partly of tallow and partly of wax. Another thin coating was then applied, to serve as a separator between the false bell and the "shell" of the bell. The latter rested on an iron ring, provided with eyes, and was bound round besides with strong iron hoops, to make it more secure. In the hollow core a fire was now lighted through an opening left at the top, and core, false bell, and shell were thoroughly dried and burnt hard; while at the same time the decorations and inscriptions of the false bell, formed of wax and tallow, melted. The shell was then lifted by means of chains, the false bell broken up, and the shell lowered again in its place, and the whole covered up. A tackle of eight sets of pulleys, which in its turn had to be raised by another set of tackle, was put up for lifting the new bell at the proper time out of the pit. The iron beam to which it was suspended had a diameter of 8 in. The furnace, with two grates at its working side, each of an area of about 33 square feet, consumed at each cast twenty tons of coal. The metal was put in through an opening at the back of the furnace, on to the hearth, of an area of over 36 square feet. At the first cast, each of the twenty cannon used for the bell was pushed in resting on a truck. They weighed together about 50,000 lb. (German); to this was added 80 cwt. of tin. At the first cast the metal took from one o'clock at night until three o'clock the next afternoon before it was perfectly liquid, fit for running off; at the two following castings the time of melting was only ten hours, from five a.m. to three p.m. At the last cast, the filling of the mould took twenty-nine minutes and a half, without any mishap. But then followed four long, weary weeks of anxious waiting, before the shell could be broken; but when it fell, the master had the satisfaction of seeing that his labour had at last been crowned with perfect success.

A feeling of silent admiration steals over the beholder as he looks upon this mighty form, 10 ft. 8 in. high, of a diameter of 11 ft. 2 in., which weighs 52,500 German pounds (over 25 tons), and which will receive a clapper or hammer of 9 ft. 10 in. long, weighing 1,530 lb. The bell, which has at the sound-bow a thickness of 13½ in., tapers towards the crown to a little over 3 in. The screw passing through the crown of the bell, and through the apparatus for receiving the hammer, is of corresponding size, weighing 996 lb., and carries a nut weighing 178 lb. The six arms forming the crown are decorated with angels' heads, and end where they join the bell in lions' feet. Below the crown, in three lines running round the bell, is the following inscription in Gothic letters:—

"Guilelmus, Augustissimus Imperator Germanorum Rex Borussorum pie memor caelestis auxilii accepti in gerendo felicissime confloiendoque nuperrimo bello Gallico instaurato Imperio Germanico. Bellica tormenta captiva aeris quinquaginta millia pondo iussit conflari in campanam suspendendam in hac admirandae structurae aede exaedificationi tandem proxima.

Cui victoriosissimi principis pientissimae voluntati obsecuta societas perficiendo huic templo metropolitano constituta F. C. Pio P. IX. Pontifice Romano Paulo Melchers Archiep. Coloniensi A. D. MDCCCLXXIV."

"William, the Most Illustrious Emperor of Germany, and King of Prussia, in pious remembrance of the heavenly aid granted him in the fortunate course and conclusion of the last French war, has ordered, after the restoration of the German Empire, a bell to be cast from captured cannon, of the weight of 50,000 lb., which is to be suspended in the house of God, now nearly completed. In accordance with this pious desire of the victorious prince, the society formed for the completion of this cathedral has caused it to be cast, under the Roman Pontiff, Pius IX., and the Archbishop of Cologne, Paul Melchers, in the year of our Lord 1874."

Under the figure of St. Peter is the following inscription:—

"Voce mea coeli populo dum nuntio sortes
Sursum corda volant aemula voce sua.
Patronus qui voce mea templi atria pandis
Janitor et coeli limina pande simul."

"Send I with brazen lips to the peoples heavenly message,
Souls upwards soar, leaving earth; join, full of ardour, in song.
Thou, who through my deep voice of the fane the portals wide open'st,
Ope thou of heaven the gate, heavenly guardian, as well."

Opposite to the image of the apostle, is the German Imperial coat of arms, beautifully executed, with this verse below:—

"Die Kaiserglocke heiss ich,
Des Kaisers Ehren preis ich,
Auf heil'ger Warte steh ich;
Dem deutschen Reich erfleh ich,
Dass Fried' und Wehr
Ihm Gott bescheer'."

"Emperor Bell I am named,
The Emperor's name make famed;
On holy ward I stand,
For German Fatherland
I pray: God grant it hence
Peace, welfare, and defence!"

In the first-named inscription is also the archiepiscopal coat of arms. The mottoes have Gothic borderings, successfully designed and executed. The pleasing appearance of the bell is further enhanced by parallel rings round it. The note sounded by the bell was to be the deep C, but according to the test committee it is C sharp; and it will, consequently be found not to be in tune with the other bells of the cathedral when tried with them. However, should this prove to be the case, the evil, the founder is confident, may be remedied by somewhat planing down the sides.

The Emperor Bell, which was shipped at Frankenthal on the 15th of April, arrived safely at Cologne on the 8th of May. The somewhat lengthened voyage, which was interrupted at the principal towns along the Rhine, to give the inhabitants an opportunity of viewing the monster, was successfully performed. The transport from the wharf to the southern tower was accomplished without accident on the 13th of May, under the special supervision of Herr Hamm, amongst the excitement of thousands of spectators. A wagon had to be expressly made for moving it from the foundry on board a sailing-barge on the canal leading to the Rhine, and this was used again on its arrival at Cologne, for its transit from the river to the cathedral. An idea may be formed of the difficulties attending it when it is stated that it took eleven hours to move the mass a distance of 350 paces on a level roadway.

We may add in conclusion, that the new bell, next to those of Moscow (both not now in use, weighing respectively 193 tons and 63 tons; the former broken in 1737, the latter fell in 1855); that at Pekin, said to weigh 53 tons; and that of Novgorod (31 tons), is the largest in existence. It exceeds in size by far the largest of our English church bells: Big Ben, of Westminster, weighing only 14 tons; York Minster bell, 10½ tons; Old Tom, of Oxford, 7½ tons; Exeter Cathedral bell, Great Tom of Lincoln, and St. Paul's bell, having a weight of 5½ tons and 5¼ tons respectively.

THE GIRTIN DRAWINGS AT THE BURLINGTON CLUB.

THOSE who are interested in the art of water-colour painting should by no means omit to visit the large and interesting collection of the works of our first great water-colour artist, at present exhibited at the Burlington Fine Arts Club, access to which is readily obtained through any member of the club. The collection is interesting not only as a representative exhibition of the works of a great and early-lost genius, and for the intrinsic power of most of the drawings comprising it, but also as affording an illustation of the aims and practice of this peculiarly English branch of art at the commencement of its career as a distinct art, and of the extent of the change which has come over it, and the gulf which separates the art of Girtin from that displayed on the walls of the Institute and the Society of Painters in Water-colour.

Viewed from the standpoint of the present day, Girtin's style would be regarded as a conventional interpretation of Nature in a remarkably broad and powerful manner, with the object of conveying the feeling rather than the facts of a scene; and it is almost curious to reflect that one of Girtin's distinguishing merits as the inaugurator of a new style in water-colour was considered to be the superior force and brilliancy of local colour in his works; whereas a modern "critic," meeting with one of them in an exhibition, would be almost certain to characterise it as monotonous and "deficient in local colour." But when we consider that, previously to Girtin, water-colour was little more than a system of washed-in effects in monochrome, it is easy to understand what a revelation his delicately-balanced tints must have appeared; and as we turn from one work to another, and realise the manner in which the artist looked at Nature, and the media which he used in representing her, we come to see that though he does not give us much of the positive facts of colour, he gives us its relative effects almost in perfection, and that we need only to learn his language to find colour, even of a warm and glowing tone, in these combinations of cool greys and warm browns so artfully composed and contrasted, yet with a result which seems rather to suggest rapid and vigorous dash of execution than the subtle artifice and patient study with which, as we know by the record of the artist's contemporaries, these works were produced.

The immense change which we see between the broad and (in one sense) conventional style of Girtin, and such brilliant colour and realism of detail as we see in every exhibition now, is not, of course, æsthetically peculiar to water-colour painting, for the style of Girtin, and in his earlier days (to some extent) of Turner, was a part of the artistic feeling of the day in landscape, when that pleasure in mere intensity and glow of colour for its own sake, which has pervaded even to exaggeration the poetry as well as the painting of the present day, was not,—and the subsequent achievements of Turner and Hunt in evolving something like actual and positive light and radiation out of pigments, would perhaps have been regarded as scarcely more desirable than possible. But the change in the method and objects of water-colour is probably owing a good deal to the improvement in the materials used, both as to purity of colour and ease of manipulation. The effects of modern water-colour would have been to a great extent impossible in Girtin's day, for want of the mechanical means of producing them. In one small drawing at the Burlington Club ("Dunrobin Castle," No. 24) we see an evident intention to produce an effect of intense brightness and sunlight on the hill and castle; but the means for accomplishing it are limited, the effect is rather raw, and the water in the foreground has had to be sacrificed to it, as it is. What is observed in the quotation from Miller's "Life of Girtin," in the introductory remarks prefixed to the catalogue, shows how the *modus operandi* of the artist was directed to making the most of a comparatively limited palette:—

"When he had accomplished the laying on of his sky, he would proceed with great facility in the general arrangement of his tints on the buildings, trees, water, and other objects. Every colour appeared to be placed with a most judicious perception to effecting a general union or harmony. His light stone tints were put in with thin washes of Roman ochre, the same mixed with light red; and certain spaces, free from the warm tints, were touched with grey composed of light red and indigo, or, brighter still, with ultramarine and light red; the brick buildings with Roman ochre, light red and lake, or a mixture of Roman ochre, lake, and indigo, or Roman

ochre, madder brown, and indigo; also with burnt Sienna and Roman ochre, and these colours in all their combinations. For finishing the buildings which came nearest to the foreground, where the local colour and form were intended to be represented with particular force and effect, Vandyke brown and Cologne earth were combined with these tints, which gave depth and richness of tone that raised the scale without any diminution of the harmony; on the contrary, the richness of effect was increased from their glowing warmth, by neutralising the previous tones, and by throwing them into their respective distances, or into proper keeping. The trees, which he frequently introduced in his views (!), exhibiting all the varieties of autumnal hues, he coloured with corresponding harmony to the scale of richness exhibited in his buildings. The greens for these operations were composed of gamboge, indigo, and burnt Sienna; these sometimes mixed with Prussian blue. The shadows for the trees, indigo, burnt Sienna, and a most beautiful shadow tint, composed of grey and madder brown, which perhaps is nearer to the general tone of the shadow of trees than any other combinations that can be formed by water-colours. *He so mixed his greys, that by using them judiciously they seemed to represent the basis of every species of subject and effect*, as viewed in the middle distance under the influence of Girtin's atmosphere, when he pictured the autumnal season in our humid climate, which constantly exhibits the charm of rich effects in a greater variety than any other country in Europe."

This passage is really curious in its way, as evincing the different methods of looking at nature with a view to artistic reproduction which may exist at different times. If it had ever occurred to the writer who mentions with such delightful *naïveté* the fact of Girtin "frequently introducing trees" in his landscapes (as if this were a sort of compliment to the scene, entirely *ad libitum*) to take one of Girtin's wooded scenes out of doors and compare it with the living foliage "in all the varieties of autumnal hues," it is possible he might have reconsidered his words. Girtin's wooded scenes are not his *forte*, and certainly no one will find anything like the richness of autumnal tints in them, though there is great power of massing the trees finely as vehicles for the light and shadow of the picture, and of defining their form and movement. But the sentence we have italicised does to a great extent give the key to the character of Girtin's art. It was a translation of nature, on a fixed principle, into the key of his palette, preserving the relations of tone completely, but ignoring both the positive colour and much of the detail. One element in Girtin's method is too characteristic to be overlooked, and we are surprised that no reference whatever is made to it in the catalogue; we mean his preference for toned paper to work upon; frequently brown and grey paper of apparently very coarse texture. Few of his drawings are so much covered as to leave nothing of the original ground visible, and in a majority of cases this is not white. This quality of paper, while it certainly increased the conventional character of his drawings, also assisted the peculiar combination of tone which he aimed at, and gave him effects which would have been attained only with much more labour on white paper. In one of the finest of the smaller works at the Art Club, "Hereford Castle from the Banks of the Wye" (No. 45), the sky and the calm river are literally nothing but brown paper, part of the river surface very slightly touched upon with a thin wash just indicating the surface, the effect of water otherwise being purely dependent on the reflections of objects. A more remarkable instance is the "Village of Kirkstall" (68), an effect on paper of a similar kind, but more laboured (if one can apply such a term to work which has so completely the opposite appearance) and evidently most carefully studied in its balance of tones. There is not a single part of this drawing,—the water, the houses, the distant rising field,—which, taken separately, can be said to represent the tones of nature; but the relation of the tones to each other is so true that, taken as a whole, the effect is perfectly real and atmospheric. The beautiful drawing, "Kirkstall Abbey" (91), is, if we mistake not, a specimen on grey paper, and the faint gleam of light over the hill, transparent and aërial as it seems, appears to be obtained by body colour added after the washes. Girtin seldom used this resource, however, and only in general for a single high light prominent in the composition. An instance of this is seen in the beautiful little drawing of "Richmond, Yorkshire" (21), a less striking work than some, but one of the finest in regard to delicacy of effect. The sky to the left is remarkably successful, and in general nothing is more remarkable in these drawings than the perfection with which Girtin gives the aërial softness and perspective to his clouds, which seem to round off and vanish into the distance in a manner which, considering how slight is the apparent labour bestowed, is a notable instance of the *ars est celare artem*.

Among the more remarkable works here may be noticed "The Rocking Stone, Cornwall" (17),—a grand and powerful drawing of the peak of a rocky hill, with a glimpse of the sea far below; the channelled weather-beaten mass of rock which leads up to the peak is given with remarkable solidity and perspective effect. Girtin is not less at home in the buildings of man than in those of nature; all his architectural subjects are fine. The large drawing of "Durham" (30), with the bridge crossing the picture, is magnificent in every respect, composition, tone, and texture, and perhaps there could hardly be a better example of the peculiar power of the artist, and of his method of dealing with the tones which he most affected, in combinations of water and building. The interior of "Exeter" (44) is as fine a specimen of architectural drawing, not excluding artistic effect, as could well be seen; clear and precise in every detail, without the slightest hardness. "Knaresborough Castle" (65) is a charming sketch of an old tower. "Chepstow Castle" (77) is not an architectural subject, but merely gives the name to a landscape remarkable for the effect of air and distance, and for the grand treatment of the rolling mass of clouds, with a strong light on one side; the treatment of the water in the foreground is odd, but the effect of open air freedom and space in this drawing is remarkable. Two large companion drawings, "Harewood Castle" and "Harewood House" (94 and 106) perhaps show the fullest extent to which Girtin had carried his art as a landscape-painter; in power and force of composition the latter drawing strongly reminds one of Turner; but the beauty of the former (94) is more characteristic of its author; the tones and contrasts of light and shadow on the opposite hill in the middle distance are managed with the utmost finish, and show in perfection that quality of the artist which we have referred to, of giving perfectly the effect of the relations of tone and colour in nature, without literal imitation. A peculiarity observable in this collection is the practice which Girtin not unfrequently seems to have adopted of making two studies of the same subject similar in point of view, and in every respect except in the key of colour adopted, and some variations in the relative force of different portions. We see specimens of this in the two drawings of "Guisborough" (22 and 49), of which the latter is simply a reproduction of the former, with stronger and darker tones; and in the two remarkable drawings of "Rainbow Effect at the Mouth of the Exe" (96 and 108), of which the former is the most effective; but both are remarkably true to the character of the Exe country. A still more curious instance is in the two drawings of the interior, apparently, of St. Alban's Abbey (98 and 104), in which the artist has experimented on two completely different methods of representing the same building in the same light; the light falls on the white reredos as the back of the picture, which in 98 is almost white, and all the other tones in proportion, cool and greyish; while in 104 the screen, still with light on it in the same direction, is a reddish-brown, and the foreground pier, where the light falls on it, is treated with great power in a strong variety of the same tint, and the jointings of the stones deeply marked, so as to dominate over the other portions. These drawings are labelled "St. Alban's Abbey" and "Winchester Cathedral" respectively; in fact, they are almost precisely the same scene, in every detail, even to the hatchments on the walls, and are no doubt meant for St. Alban's Abbey, though the artist seems to have blended a reminiscence or two of Winchester with it, through some odd freak of fancy or forgetfulness. We can only mention two other notable drawings, "Morpeth Bridge" (109), interesting, not only as a remarkably fine one, but as being said to be the artist's last work; and "The White House, Chelsea-reach" (102), which Turner is stated to have pronounced superior to any of his own drawings. It may be questioned, perhaps, whether Turner would have thanked any one else for saying so; but this little combination of colour and light over a calm river is something extraordinary,—a kind of inspiration, which might be paired off with Cotman's wonderful little drawing, called "The Hay-barge" (in the last International Exhibition), as a specimen of a style of effect in which, once or twice, these three artists, of unequal fame, seemed to have touched each other so nearly as to fall almost into the same quality and feeling. We like to mention the three together, for they were kindred geniuses, and perhaps Cotman under happier circumstances, and Girtin with a longer life (he died, it must be remembered, before he was thirty), might have claimed a place nearer to the mighty master of landscape than is generally assigned to them.

The age at which Girtin died renders it, in fact, difficult to estimate what he might ultimately have accomplished; and the fact of the want of dates to nearly all the drawings here precludes any definite judgment being formed of the tendency of the painter's genius during the short period of his artistic life; we can hardly trace a development of style, the few drawings which are dated scarcely giving any indication of a "later or earlier manner." But the collection is of the highest interest and beauty, and we owe thanks to the gentlemen who have lent the drawings, and to the club which has afforded the opportunity for their collection and exhibition, and which is doing much for art and artists in this way.

THE MEMORIAL CHAPEL, WINDSOR.

OUR readers are aware that for some ten years past works have been going on by command of Her Majesty the Queen, to render what was formerly known as the Wolsey Chapel at Windsor worthy to perpetuate the memory of the late Prince Consort; neither pains, money, nor skill has been spared, and the result is an interior of unequalled splendour,—floors, walls, windows, and roof being alike magnificent. The chapel being now complete, it is thought likely that it will before long be opened occasionally to the public; so, leaving for another opportunity such general and critical remarks as may seem called for, we give at once a complete and correct list of the subjects illustrated in the decorations.

The vaulting of the chapel is filled with mosaic work by Clayton & Bell, executed by Salviati, with angels bearing shields, with devices symbolic of the Passion in the apse, and heraldry relating to the Prince Consort in the nave.

The blank window at the west end, filled with mosaic work by the same hands, contains standing figures, as follows:—Henry III., Edward III., Edward IV., Henry VII., Jane Seymour, Anne, Duchess of Exeter; Edward Clinton, Earl of Lincoln; Charles Brandon, Duke of Suffolk; Henry VI., Henry VIII., Charles I., George III., Sir Reginald Bray, Sir John Shorn, Elizabeth Woodville, wife of Edward IV.; Henry Somerset, Marquis of Worcester; Archbishop Bambridge, M. A. De Dominis, Mathew Wren, Bruno Ryves, Bishop Beachamp, William of Wykeham, Cardinal Wolsey, Dean Urswick, Bishop Turner, Bishop Robinson, Bishop Douglas, and Archbishop Sutton.

The stained glass in the five windows in the apse, also by Clayton & Bell, has the following subjects:—

The Garden of Eden:—Including Creation of Adam, Naming Animals, Creation of Eve, The Tree of Life shown, Adam and Eve blessed, The Fall, Hiding, Doom, Expulsion, Clothing, Labour, and Abel's Sacrifice.

The Garden of Gethsemane:—Judas receiving Bribe, Judas lying in Wait, Agony, Sleeping Apostles, Judas bringing in Band, Soldiers falling down before Our Lord, The Kiss, Cutting off Malchus's Ear, Healing Malchus's Ear, Binding Our Lord, Young Man following Our Lord, and Our Lord led out.

The Passion Window:—Our Lord before Caiaphas, The Denial, Before Pilate, Scourging, Crowning with Thorns, Ecce Homo, Pilate washing His hands, Bearing the Cross, Disrobing, Crucifixion, Descent from Cross, and St. Joseph begging the Body.

The Garden of St. Joseph of Arimathea:—Bearing the Body, Embalming, Entombment, Setting the Seal, Watching, Resurrection, Angels rolling away the Stone, Angels folding up Cloth, Angels and Maries, Noli me Tangere, Our Lord and three Maries, and SS. Peter and John at the Sepulchre.

The Garden of the Blessed:—The Afflicted, Maids and Widows, Rich and Poor, the Learned, Priests, Kings, Queens, Soldiers, Patriarchs, Prophets, Martyrs and Innocents, and Apostles.

The windows on the north and south sides of the chapel illustrate the *genealogy of the Prince Consort*, represented by figures and their heraldic bearings in full achievement. Commencing at the west end of the north side are seen:—Witekindus Magnus; Dedo I. Comes Wettini; Dietricus II. Comes Eulenburgii et Landsburgii; Mathildis Hæres Misniæ; Thimo Strennus, Marchis Landsburgi; Conradus Pius primus Marchio Misniæ;

Otto Dives, Marchio Misniæ; Hedwig; Dietricus; IV. Vexatus Comes Weissenfelæ et Marchio Misniæ; Judith Hæres Thuringiæ; Henricus Illustris, Marchio Misniæ primus Landgrafius Thuringiæ; Albertus Degener Landgrafus Thuringiæ; Margareta; Fridericus I. Admorsus; Fridericus II. Severus; Mechtildis; Fridericus III. Strennus; Catharina Hæres Coburgii; Fridericus I. Bellicosus Primii Saxoniæ Elector; Fridericus II.; Margareta; Ernestus I. Elector; Albertus Animosus Dux; Fridericus III. Sapiens Elector; Johannes I. Constans Elector; Johannes Fridericus I. Magnanimus Elector; Sibylla; Johannes Ernestus, Dux Saxoniæ Coburgi; Mauritius, Elector; Johannes Fridericus II. Medius, Dux Saxoniæ Gothæ; Johannes Wilhelmus I. Dux Saxoniæ Vimariæ; Dorothea; Johannes III. Dux Saxoniæ Vimariæ; Johannes Casimirus, Dux Saxoniæ Coburgi; Ernestus III., Pius, Dux Saxoniæ Gothæ et Altenburgi; Elizabetha; Johannes Ernestus VIII. Dux Saxoniæ Salfeldi; Franciscus Josias; Ernestus Fridericus; Fridericus Josias; Franciscus Fredericus Antionius; Ernestus I. Dux Saxoniæ Coburgi Gothæ; Luisa; Maria Luisa Victoria; Leopoldus Rex Belgarum; Ferdinandus, Rex Lusitaniæ; Ernestus II. Dux; and Albertus Princeps.

The Wall Spaces under Windows contain subjects in inlaid marble; those at the east end being each surmounted by a carved bust of an Evangelist and having on either side a bust of an Apostle: those in the nave having each a bust of a member of the Royal Family at top and an angel on either side, the subjects executed by the late Baron de Triqueti, the busts by the late Miss Durant.

The subjects on the south side reading from the east are:—Angel Weeping in the Sepulchre; Jacob Blessing his children; Joseph made Ruler over Egypt; Return of Isaac with Abraham from the Sacrifice; Moses Blessing the Children of Israel; Daniel in the Lions' Den.

On the north side reading from the west we find: Nathaniel (Sincerity); David (Eloquence and Harmony); Solomon receiving Presents; Jehoshaphat sending Priest and Levite to teach in Judah; Jephtha's Daughter; Jeremiah Lamenting over the Tomb of Josiah; Agony; Entombment.

The sculpture of the altar represents the Resurrection, and is also the work of the late Baron de Triqueti.

In the centre of the marble pavement stands the effigy of the Prince and the Cenotaph by the late Baron de Triqueti; and we will only add, at present, that the whole of the works have been executed under the direction of Sir G. Gilbert Scott, R.A., as architect.

SCULPTURE AT THE ACADEMY.

To pass without note or comment the contents of the sculpture-room would seem like a sanction of the prevalent indifference to this art; though it must be admitted that it will be but a short task to mention the works which are of any importance or value. One excellent name, that of Mr. Woolner, is unrepresented. There is no such group as the "Danse" of M. Carpeaux to remind us that in France there are artists who, with whatever faults of style, can still rise above the prosaic in the conception and execution of a subject; and the works which at all repay attention are chiefly the productions of two or three old contributors, who show the usual average of excellence, but hardly more. Of these the most important, perhaps, is the group of the "Siren and the drowned Leander," by Mr. Durham, the plaster model of which we noticed a year or two ago in the International Exhibition. The siren sits with the dead body stretched across her knees, gazing mournfully into the countenance, as if striving to understand where the life has fled to. There is much pathos in the group, which is composed so as to bear looking at from all points of view; the right arm of the siren seems, however, thin, and somewhat shapeless. The same sculptor's model for the bust of Hogarth, on a large scale, for Leicester-square, is a fine specimen of bold and effective modelling, and worthy of its subject. The story of Leander forms the subject of another important work,—a bas-relief,—by Mr. Armstead, showing the swimmer dead upon the shore, and Hero, with hair wildly blown about in the wind, weeping over him; an eagle which seems prepared to attack the corpse, fills up the left side of the composition, with outstretched and advanced wing: the work is in that very low relief which affords such a delicate and difficult problem to the sculptor in its subtle blending of relief with perspective; in execution this work is, perhaps, superior to the Leander group before alluded to, though in feeling, we think, less unusual. Mr. Armstead's seated figure of "Philosophy," designed for execution in bronze for a fountain at King's College, Cambridge, exhibits a female figure of considerable dignity of expression and pose, in the act of intently perusing a scroll; in endeavouring to give the somewhat strenuous and masculine character which the artist seems to have aimed at as befitting the subject, the arms have been made of an exaggerated and formidable "scantling" (to borrow a building term), with which the scale and proportions of the torso are hardly in keeping. Mr. Calder Marshall shows remarkable ability, in his "Nausicaa," in dealing with an unusual pose and action of the body; the princess, nearly nude, is letting herself down to a lower level of the rock to pick up the ball which has been thrown and lies at her feet, half supporting her weight on her two hands placed on the ledge of rock behind her; in choosing this position and action the artist has set himself a most difficult task, in which he has been quite successful in giving the muscular effort of the body without losing the repose and flow of line so important in sculpture; it must be admitted that the figure might just as well represent any one else as Nausicaa. The sculptor's "Convalescence," a clay model of a woman, fully clad, reclined in a chair in slumber, is a successful example of sculpturesque treatment of a realistic subject, far superior in its unpretending breadth of manner to the elaborately-dressed statues, all lace and crinkles and folds, which the corrupt taste of modern Italy in sculpture has set the fashion of. Mr. Marshall's third work, "Marguerite" (Goethe's heroine), hurrying along with wild eyes and garments blown back from her figure, to drown the child whom she clasps convulsively in her arms, is another work of considerable power; and if the distinct types of expression in these three figures by the same hand are taken into account, it must be conceded that Mr. Marshall is quite equal in this year's Exhibition to the reputation he has built for himself. We devoted some words to Foley's works recently, and may just mention that his bronze figure of "Stonewall Jackson" occupies a place in the Lecture Room, and the marble statue of the Prince Consort (for the University of Cambridge), and the plaster full-size statue of Sir Benjamin Guinness, are in the central hall. Mr. E. B. Stephens has had a definite and original aim before him in his two figures of young girls in the act of devotion, under the title "Evening" and "Morning": the former is the best, and both the expression and the physical conformation of young, half-developed girlhood are well given. A piquant contrast to these are Signor Barzaghi's two very clever figures of girls, called "Blind Man's Buff" and "Vanity"; the latter is, like too much contemporary Italian sculpture, pictorial rather than sculptural; but the former, though a trifle sensational, is an unusual and effective figure in action and *motif*. Mr. Boehm, who has generally been represented by portrait figures of a more courtly type, is this year conspicuous with a sitting figure of Mr. Carlyle, which shows qualities beyond the average of ordinary achievements: the face is a good likeness, and very expressive; the mouth especially has been carefully studied. A long dressing-gown, as one may suppose it, envelopes the figure, and furnishes the breadth of surface and flow of line which ordinary modern costume unhappily refuses to the sculptor. The name of Mr. Bruce Joy is appended to several things that are more or less good,—in particular his seated figure of a girl reading, called "The Fairy Tale" (terra-cotta), noticeable especially for the carefully-studied, and yet apparently spontaneous, manner in which the limbs and the drapery alike combine to give a movement of line, as by a consentaneous impulse, from right to left of the figure. This is a very good work in a quiet way,—more satisfactory than the sculptor's more ambitious work, "Forsaken," which very much wants repose, and is again an instance of pictorial treatment of sculpture. After these, attention is divided by works of more or less technical merit, some simply repeating commonplaces of *motif*, which have been worn out long ago; others appealing purely to the "goody" sense of the English exhibition-going public, in works with a religious or moral title; among which, by the way, Mr. J. Bell contributes a bas-relief of the "Struggle between Good and Evil" which is so palpable an imitation of our greatest sculptor's treatment of the same subject, that it really should have appeared in the catalogue as "Flaxman and Bell"; and another artist sends a realistic group of mother and children, which might shortly be defined as "Dalou-and-water." Among the crowd of busts and portrait medallions we may particularise, as rising above the average, and attaining to artistic interest, Count Gleichen's family group of basrelief heads on a gold ground (perhaps chiefly interesting from its novelty); Miss Nottidge's two basrelief medallions called "Edie" and "Miss Maggie Harrison"; Mr. E. Gibson's two portrait medallions (1288, '90); M. Malempré's "Master Miss"; Mr. Bruce Joy's posthumous bust of Napoleon III.; M. Dalou's terra-cotta bust of Mr. J. E. Hodgson; and Mr. Adams-Acton's bust of Lady Victoria Campbell, which is very original in manner and treatment. We have not overlooked this latter sculptor's large figure of "The Angel of the Resurrection," but cannot term it a success, while it too much recalls Tenerani's work with the same title.

DOVER.

THE ancient Dwr or Dwfyrrha—the original British name by which Dover was known—vies with any town in the kingdom for the splendour of its ancestral traditions, whether as town or port, and its historical importance as the key of these realms during many centuries of warlike strife in Western Europe, is second to none. Conveniently situate in a valley, fringed by the sea, under the shelter of high cliffs upon the right and the left, the nearest port to the Continent, it has, during nineteen centuries, enjoyed the sweets of peace and felt the horrors of warfare, as well as seen more brilliant deeds of manly daring and skill than any ultra-metropolitan place within the dominions.

Possibly the oldest parts of Dover remaining, and now known, are within the castle precincts, where are portions of the church and fortifications of the Roman period, while many of the various styles of architecture since those times contribute to the existing military fabrics. This church, or the original one whereon the foundations of the present church of St. Mary the Virgin rest, is supposed to have been erected in the second century by Lucius, son of Coilus, king of Britain, on the establishment of Christianity in this country, in which he was assisted by Eleutherius, bishop of Rome. The town itself also possesses fragments of bygone monkish days, which have in their times played conspicuous acts in history. The Maison Dieu, or God's House, was founded as a hospital by Hubert de Burgh, Constable of the Castle, and for some time joint Protector during the minority of Henry III., after the death of Pembroke, and he bravely defended the citadel against Prince Louis, who besieged it, and thus not improbably saved England from a French succession. Its immediate object would seem to be a serai, or travellers' rest for pilgrims journeying from the Continent to the shrine of A'Becket at the neighbouring city of Canterbury. The building passed into disuse for religious and hospitable objects, on suppression of the monastic establishments, at which time its revenues amounted to 231*l.* 16*s.* 7*d.*, and for several centuries served ignoble purposes, either as victualling stores for the Royal navy, or as stables and shambles, until finally, a few years since, a more worthy purpose was found for the relics, on their becoming the property of the corporation, who restored and converted the structure into an Hôtel de Ville, which contains many valued objects, also excellent stained windows, and paintings illustrative of events of national as well as local interest.

On the outskirts of the town, on the Western Heights, were discovered early in this century the remains of one of the few Knights Templars' churches which were established in A.D. 1118. This relic, however, claims notoriety as the spot where, at an early hour in the morning of May 15, 1213, King John Sans-terre or Lackland disgraced himself by swearing fealty to Rome, and on his bended knees before the legate Pandulph,—in presence of his barons and knights,—declared himself and England vassals of the Pope! A much more pretentious range of buildings was St. Martin's Priory, of about the same date as the Templars' church. Its history, however, goes back far beyond the time of Henry I. The church itself would seem to have been a grand imposing structure, proportionate to the other buildings of the priory, and cathedral-like in its dimensions.

To give an account of the castle and citadel fortifications in any way adequate to their deserts, of all the scenes and incidents in their chequered and eventful career during so long a period, would be to write a long history, for they have played conspicuous parts in many national dramas from before Cæsar's time down to our own.

Of late years the construction of the Admiralty pier,—the further it extends into blue water,—affords excellent facilities to Continental traffic for landing or receiving passengers and goods in any state of the tide and weather. It is a fine specimen of engineering skill: Portland cement with shore shingle enter largely into its internal and submerged construction, faced with grey granite. The whole forms a splendid promenade of half a mile or so in length, having lines of rail branching from the South-Eastern and Chatham and Dover Railways, running throughout the entire length to facilitate as well the works in progress as also the permanent traffic. Considerable shelter from southerly gales is now provided by the pier to vessels riding in the haven; but should the more extensive works, now agitated for so many years, for a harbour of refuge be carried into execution, Dover would then in very deed become the famous port Sir Walter Raleigh deemed it, himself a travelled mariner of great experience, and capable of giving valuable advice. He said,—and his words may not be without weight even now:—"No town or haven in Christendom is so placed by nature and situation, both to gratify friends and annoy enemies, as this town of Dover. No place is so settled to receive and deliver intelligence for all matters and actions in Europe from time to time. No town is by nature so settled either to allure intercourse by sea or to retain inhabitants by land, to make it great, fair, rich, and populous. Nor is there in the whole circuit of this famous isle any port, either in respect of security or defence, or of traffic or intercourse more convenient and needful than this of Dover."

As a health resort, whether marine or rural, the town and suburbs possess great advantages, of which the inhabitants make the most, and the local authorities seem desirous of effecting improvements of public utility. Geologically speaking, the town is for the most part built in a chalk valley denuded, filled up again to some extent with beach-gravel, which gives a dry surface to the ground, but somewhat wet subsoil. On the beach, with a south aspect, are some fine terraces of villas and mansions, enjoying a good sea view, and where the occupiers, be they residents or temporarily visitors, inhale the ozone-charged air breathed in gentle zephyrs from the Channel. More inland, good streets are observed, of well-built, well-designed dwellings, shaded with trees, and front gardens neat and trimly kept. Dover early adopted, and carried into effect, the Public Health Act of 1848, constructing lines of trunk and intercepting sewers, diverting the sullage-water from the Pent or Harbour Head direct into the bay. However, the points of debouchure upon the beach, although great improvements upon the old system, are not at all in accordance with modern ideas of sanitation. The sewers discharge by several outfalls into the bay. The Castle drain pours its contents on the beach below low-water mark, on the east or town side of the great pier. The town and citadel sewers discharge into the bay on the opposite or west side of the pier, chiefly by gravitation, but in the case of the borough drainage, by pumping for an hour or two before and subsequent to high water. From the set of the currents, from surface-action of the wind from the southward, and the pent-up waters of the bay, the sewage, although delivered into an immense body of sea water, is under certain conditions thrown back upon the beach, becoming a nuisance to bathers and promenaders, and to some degree polluting the air, in hot weather, blowing to the town, from fœcal matters left on the shore. Several remedial schemes are proposed for dealing with this difficulty—that under discussion by the Board for some time past is for amalgamation of the various outfalls and conveyance of the foul waters a mile and a half further from the town, beyond Shakspeare's Cliff in the direction of Folkestone. But whispers are heard that even if carried so far away the action of the tidal currents may prove unpropitious and reconvey the sewage back to Dover Bay. Herein, however, the Sanitary Board being fully alive to local interests will be satisfied experimentally before committing themselves to any final undertaking.

In a great measure Dover is free from those social nuisances so prevalent in many towns—especially old towns—back-to-back houses, closet cesspits, and yard pumps, with as a resultant the enjoyment by the inhabitants, as a body, of good health and low mortality bills. The water supply—abundant, pure, and cool—is derived from wells sunk deep into the chalk on the hill side near the castle, from whence it is pumped into cavernous reservoirs holding a million gallons and a half, well down below the ground surface. Here, however, as is too commonly the custom in our towns, the service is intermittent and delivered into house cisterns, although the practice is yearly less prevalent. In some few spots personally inspected we found the conditions under which the domestic supplies were delivered not quite creditable to Dover,—viz., the service discharging into tanks open to receive local contamination from defective "closets," and where the flushing and drinking water was furnished by the same cistern. Ventilation of sewers by passage of gaseous matters through charcoal trays, is provided for in several parts of the town; but from the condition of some of the houses an extension would seem desirable in older and central districts. The paths and roads of the town are in fair condition, and well scavenged; yet the introduction of gas-tar pavement does not seem altogether successful, if judged by the soft consistency of the mass, possibly due to insufficiency of boiling. Putting aside the defects referred to, and some that we may on another occasion revert to, we give a hearty commendation to Dover as an invigorating and pleasant seaside resort for all classes.

BIBLICAL ARCHÆOLOGICAL SOCIETY.

AT a meeting held on Tuesday evening, the 1st of June, Dr. Birch, president, in the chair, a beautiful series of water-colour sketches of temples and other buildings and antiquities in Thebes, and on the banks of the Nile, were exhibited. They are the production of Miss Edwards, who was present, and described them in a graphic manner. One remarkable subject of interest was the discovery of a speos, or rock-cut chamber, close to the large temple of Ipsambul, or Abou-sambul. Miss Edwards was, with a party, making a trip up the Nile, and one of the party, Mr. Mackinnon, had gone on shore, and was examining the surface of the rock, close to the gigantic seated figures, on the return face at the level of the feet. He saw a rent in the rock, and, clearing out the sand, and pushing in a stick, found that it entered the whole depth. He then sent for Miss Edwards, saying he had made a discovery. By perseverance they cleared away the sand deeper down, employing many of the natives for a couple of days, and came at last to a square aperture, which opened into a chamber 12 ft. by 12 ft.; and found that a large fragment of the ceiling had fallen on the floor. The sand had drifted into the chamber and filled it to a great depth. One side only, at the further end, was sculptured with hieroglyphic inscriptions and figures, and there were some characters written in chalk, stating that the chamber had been visited by some officer, probably of Rhamses II.

This discovery seems to prove that if the sand were entirely removed around the lower part of the rock, a tedious but not difficult task, many other chambers might be discovered, and probably produce curious results,—a pleasant occupation for future travellers.

Oxford Architectural and Historical Society.—The second excursion this term was to Coventry; but, partly in consequence of the uncertain weather, partly in consequence of the engagements of members, very few assembled to join in it. The programme was, however, gone through. A meeting of the Society was held on Tuesday evening, last week, at the Taylor Buildings, when Mr. W. S. W. Vaux, M.A., Balliol College, read a paper on "Recent Researches at the Colosseum in Rome," before a rather large audience. Mr. Vaux attempted to show that the excavations proved that at some time or other the great amphitheatre had been used for naval combats as well as for the ordinary gladiatorial contests, and at the conclusion of his address a discussion took place, in which Professor Westwood, Canon Ridgway, the President of Trinity, and Mr. James Parker took part, the latter differing from some of the views enunciated by Mr. Vaux. The usual vote of thanks terminated the proceedings.

ANTIQUE AND MODERN HORSE-RACING ARTISTICALLY VIEWED.

THERE is certainly one, if not more than one, word in daily, nay, hourly use, which will and must before long demand from the thoughtful some attention. It already, as it is, puzzles those sorely who find themselves, whether by design or accident, in some but little known spot on the earth's surface. We refer to that most significant and comprehensive word "civilisation." What is *civilisation?* and in what and how far does our *modern* civilisation differ from those older civilisations in the remote past which have gone before it, and to which it owes so much? A wide enough question this; and without attempting to fathom it, deep as it is, at present, we would dwell for a moment on one single phase of it,—just at this time of the year of special interest. It has been said, and often enough repeated, that it matters but little, in the attempt to judge of the "status" of a people, to know who it was that made such people's *laws*; but that it does matter to know who they were that made their *songs* for them. And the same may with equal truth be affirmed of their "business," as contrasted with their "amusements"; and more than all, perhaps, is it significant to know of the *form*, more or less artistic, which those amusements or pastimes assumed. It is impossible to pass a "Derby-day" without some such thoughts as these, or without a mental comparison or two between the racing "games" of Old Greece,—so highly civilised in so many ways,—with our own annual horse-racing displays. And not only as to these realities, but at their pictorial representations in whatever way these have been made, and are being made. It is, therefore, to this *artistic* aspect of the Derby horse-race, and to kindred things, that we would call a moment's attention, and revert at the same time to that older state of things which men can no longer see, but can still read about, and get a glimpse of, through the artistic work of those who, at the time they were visible, made some record of them.

But before we thus glance at these strange things and evidences of "civilisation," if they be so, we may remind the reader of one remarkable,—for remarkable it certainly is,—evidence of modern imitative and reproductive power. We allude to those exceedingly clever and painstaking representations of Classic life and modes of existence and manners, which some of the French painters, such as Gerome, Coomans, Magner, have given to the world. All, more or less, know a something of the multitude of pictures and engravings almost without end, which exist, representative, in an imaginative way, of the classic life and ways of work, and life scenes of the antique Greek and Roman. Quite into another world at times they certainly do carry you; but still are they all more or less false to the actual truth of things as they then were. Accurate knowledge of Classic details, details of costume, and architecture and household furniture, and a whole multitude of little matters which altogether went to make up Greek and Roman daily life, whether public or private, were wanting, and these French painters with study and ingenuity have got all these together, and have been able through them to build, and furnish, and people a Greek room of 2,000 or more years back, and to show the world what it looked like almost with as much accuracy of detail and fidelity as if they themselves had lived in that remote day, and, like the famous sleepers, had but wakened up for a brief moment to tell us all about it. We might cite not a few instances of it, but it is hardly needful, as many of them must be familiar to all. One of the most striking of these, and which bears on our present subject of inquiry, is "The Chariot Race," by Magner. It shows us a something of that always exciting scene wherein men and horses strive together for the mastery. Herein we may see a little of the intense eagerness and impetuosity of the old racers. All and everything would seem to combine together to intensify and add to the interest of the scene. The dresses of the drivers, the form of the chariots, the harness of the horses, all harmonise together, and combine to produce an artistic unity. Nature has certainly done her part, and art has but *added* what was needful in a special and individualised and national way. It would, perhaps, be impossible to cite any other example of nature and fine art in combination, and living action, so complete as this of the antique and world-famous chariot-race; and looking at them

even at this distance of time, it must cease to be matter of surprise that chariot-races excited that intense interest in the multitude that we know they did. *Fine art in action* was certainly the rule in old Greek life, and, in its degree, of old Roman life as well,—a phase at least of a high civilisation. We say "civilisation," for art surely, when thus pressed into the service of daily life, and even into "shows" and "pastimes," is a fair test of its presence.

There is, too, another thought here which occurs to us, and one which might well engage profitably the attention of the thoughtful. It is that of the indestructibility of some things. Of the precise date in the world's history, of the first horse-race, who would venture to determine? Far beyond the time certainly when history began to record the world's doings. The last horse-race happened but yesterday. However different the surroundings, and accompanying apparatus, the main ideas were and yet are the very same. The most advanced civilisation has not destroyed horse-racing, or the love for it in human beings; it has but changed, whether for better or worse, the art which must needs in some shape or other form a part of it. The "Derby" is a great artistic show of a certain kind, and wealth does all it possibly can to help and to add to it, and surely no expense is spared after the show itself is over to record it in forms more or less enduring and multitudinous. And the question occurs in more forms than one, has an ever advancing and refining civilisation, stretching from a remote antiquity to the present hour, done much, and what, to refine and make more artistic this world-wide pastime? And again, will the civilisation of the future eventually destroy it, and do away with it, or will it still further refine on it, and make it yet more and more artistic?

It is certainly somewhat unfair, though it is done perpetually to *compare* too closely one distinct style of art with another, for the purpose of determining priority of merit. It thus happens perpetually that some style or other of art or architecture comes to grief, and gets hopelessly, at least for the time, condemned. Thus the very Greek itself, the ideal of perfect work, as far as things human can be perfect, has at times suffered eclipse. But the beauty of such work never dies, and ever asserts itself with new force, and the mind is captivated with it again and again, sometimes in spite of itself. An English race-course, with all its accessories, as seen the other day, has a charm of its own, without doubt, but it might puzzle the keenest of art analysts to define the art style to which the whole of the show might be supposed to belong, looking at the whole matter, as we are here doing, from a purely artistic point of view. And it is this consideration that makes comparison with the old Greek forms all but impossible, if not, as we say, unfair. But still is comparison of some kind or other a necessity, for without this element, so useful in many ways, it would be difficult indeed to come to any certain conclusion at all in so changeable a matter as fine art. It must help, therefore, those who care to look a little closely into things past and present to compare attentively these graphic representations of the past of, horse-racing with the present, both to be seen without much journeying or trouble. The oftener and the closer these are looked at the more evident does it become that in the classic days it was the study of those who managed the "race" to harmonise artistically every detail of it. We are looking at this subject from a two-fold point of view,—as art in action, and as a fitting subject for pictorial and sculpturesque treatment. It was the first of these that so delighted Goethe, and it is of the two the most important, and certainly the most difficult to get a clear idea of. In the old Greek games, whatever they might have been, and putting aside their religious significance, there was always an effort made instinctively to render them artistic, and to harmonise the different elements in them, and, in short, to make the most of the opportunity, and to utilise it as an art influence. Nothing seems to have been forgotten or missed, and there can be now no doubt that the great and wonderful power which the Greek artists acquired over form is to be attributed in the main to this idea of utilising these "shows" and "games" as art influences, and to their perpetual sight of them.

Now let us turn for a moment to our own horse-racing shows, of which there are so many, all the year round, and of which so many representations and pictures are always being made. Of the *picturesqueness* of "the course," and all that it contains, there can surely be no manner of doubt, of its life, and movement, and perpetual changefulness, there can be no miss; but of fine art it might be difficult, indeed, to find much evidence. What there is of it is accidental, and appears but here and there, in fitful spots, and belongs to individuals. It would, perhaps, have been impossible in the antique horse shows to have found any group absolutely unfitted for the purposes of the sculptor. So thoroughly and completely did the horse and his rider or driver understand each other and work together. But this is hardly to be said of their modern successors. We might here go into details, and point to not a few things not a little incongruous and out of harmony with each other. To "witch the world with noble horsmanship" would seem to have been the aim of the antique horse-show; and to compel all things about it to combine in artistic harmony to this end. In the modern display this most surely cannot be seen, and is may be hardly to be looked for; but it serves to show how much there is in the future to be studied and to be at least aimed at. We have hardly dared to hint at the architectural surroundings of these great and popular gatherings, for much is conjectured, though much is certain and clearly to be made out in the antique shows. A very slight glance, indeed, is enough to evidence how much has to be done, and what a wide field there is for improvement here. Indeed, so strikingly does the difference between the old and the new make itself felt, when we come to the architecture of the matter, that we are apt to forget the sculpturesque portion of the work and to ask for the architecture first. We need not here trust altogether to the ingenious French painters who have done so much to interpret these curious things, for we may see not a little of it on coins and medals, and in fragments of sculpture, and thus find out, without possibility of doubt for ourselves, what the men of the old world did for their recreation and amusement, and, may we not add, for their own instruction and education, and, must we not say it, high "civilisation!" Art always present surely is one sign of this.

TECHNICAL EDUCATION OF WORKMEN.

IT seems to be desired that opportunities should be afforded to workmen to obtain a practical and scientific knowledge of their trades, in order to emulate the great developments of manipulative and intellectual skill in certain branches of industry on the Continent. One main object sought is to supplement the daily experience of apprentices, so as to enhance the value of the time devoted by them to the mastery of their several crafts; and, in addition to this, to complete the industrial training of young journeymen, and stimulate the faculty of invention for useful, rather than fanciful, purposes; a point of the utmost interest, if we remember the waste of ingenuity too often characteristic of working-class exhibitions. Thus we have tea-caddies composed of 2,000 bits, hearthrugs wrought from shreds of every uniform in the British army, and kindred trivialities which are, in reality, no more than proofs of patience, and an indifference to the substantial ends in view. The suggestion that a man who can artistically piece together several hundred eccentrically-shaped fragments of wood or cloth, will probably be a good hand at cabinet-making or pattern-drawing scarcely holds good, because it is rarely found that men carry these ingenuities into their own trades; for, as a rule, if they design a pretty bird-cage, bird-cage making is almost sure not to be their habitual vocation; while the contriver of a new easy-chair is very likely to be a manfacturer of fishing-rods. At the same time, all that renders home pleasant and healthy to the artisan merits the warmest encouragement; so that window-gardens, clean, cheap, and convenient fowl-houses, appliances for facilitating comfort and tidiness in small dwellings, and so forth, are by no means to be despised. But the true utility of technical culture, understood in its broad sense, consists in, to begin with, a proper knowledge of implements, whether for field-labour or the workshop. Let the tools be those of sewing-machine makers, book-binders, hand-wrought gold chains, or whatever else in the infinite variety presenting itself, here is the solid ground of competition for the British mechanic and his fellows in America or Europe. Thus, to quote an example or two at random, the Belgians claim to have invented the best baking oven, the Germans the best shoe-last, the Dutch the best spectacles for ironworkers and founders, the Badenese the best cooperage, and the last the best carpenter's bench, the last being a claim which is admitted in many parts of the Continent. It is in such directions that the English industrial opportunity lies, and it is in this direction, to a great degree, that an honourable rivalry should be stimulated. The French have pushed us hard, it is admitted, in the matter of punches and shears for working by hand metals of even considerable thickness, together with their circular saws, mortising machines, and chisels, excellent alike in solidity and finish, as the shipwrights of Hamburg and the seaports of the North testify, as well as official reports. The Germans, moreover, are making swift advances in the manipulation of steel and hardened iron, and attribute their success principally to their system of capital instruction. It is unnecessary to disparage the products of our home genius in order to make these admissions; since, in many instances, England keeps the lead, and the only danger is lest competition abroad should, under the influence of superior training, overtake and pass her in the race. So much, indeed, was lately admitted by a lecturer in the Technical School of Mulheim, who told his hearers,—a most intelligent class of working men, interested in a particular sort of industry,—that they were far behind the English in such manufactures as those of plumbago crucibles, syphon condensers, distilling apparatus, smelting furnaces, the assay of gold and silver, and metal refining generally. These people, it should be borne in mind, almost live in a laboratory, and are sure, after this hint, to turn over the leaves of their books, and multiply their experiments quickly and intelligently enough. All that the English workman has to do, however, is to maintain his relative position, which technical study alone can enable him to do. If we can make boots which the Germans are glad to buy, even at Mayence and Leipsic, despite their admirable shoe-lasts, on account of their cheapness and excellence, why, it is asked, not assert a similar distinction in other arenas, hard as, in special branches, the rivalry may be? But there are two distinctive characteristics of technical education on the Continent, which ought not to be passed over. The first is that, in accordance with the idea, hackneyed rather in expression than in development, of combining amusement with instruction, children are taught, not only to practise industry, but also to delight in it, and in new contrivances connected with it, from their tenderest youth. There is no hardship, even to the infant pupils of Amsterdam, in learning to draw from models; to plait straw; to twist, fold, and cut paper; to play with dissected maps, and ask questions about them; or to understand how, and of what materials, a house is built. On the contrary, these little exercises afford them much pleasure, without overweighing their intelligence, as the bright young faces show; although, of course, the principle in injudicious hands, is liable to abuse. In the second, fond though the Continental workman is of his song and of merriment, he generally employs himself in reflecting upon, and modelling, as it were, suggestions associated with his own craft, whether it be pottery, mill construction, the foundations of structures, the arrangement of staircases, fixed or locomotive engines, boring metals, carpentry, dyeing, or weaving. To encourage this exceedingly valuable habit of the mind, the Austrian Government issues, every year, a technical dictionary of all the tools and implements used in industry, which, though costly, is available for the working man, through the medium of free libraries. In the preface to this important compilation, it is invariably reiterated,—"In all occupations, there are many grades, and to reach the highest is an ambition not to be underrated; but, at the same time, not easy to fulfil." On the other hand, it seems an equally vital point, as a matter of technical teaching, that not merely should the workman thoroughly master his own craft, and thereby elevate himself in the industrial ranks; but that he should comprehend how best to apply his wages, when he has earned them, and this is said without the slightest intention of moralising upon his social habits. His great necessities, included under this head, are:—The necessities of healthy living, the possibilities of humble household improvement, the fabrics which will wear longest and be the most serviceable, the food that is most palatable and nourishing—with the methods of preparing it; the difference between sham and substance in furniture, clothing, and all else essential; and the chances of benefiting through the examples of other nations, always keeping in mind the con-

trasts of climate. It is not too much to say that technical, which is only another word for practical, education of this kind, would add largely to the wealth and happiness of the working classes. At the same time, it need by no means be understood that these are the limits within which, or even including a thorough knowledge of special craftsmanships, the education we are speaking of should be confined. A thoughtful and keen-sighted inventor will often burst every bond of habit, and find himself in an entirely new industrial region, or even in one above that which is commonly described as industrial. In these cases an ordinary institute is no longer a sufficient school for him, albeit he might not be of that marvellous genius which hammered out from a single bar of iron that tree-like cross at Antwerp; and he must seek a higher instruction, wherever it is possible for him to find it. Nevertheless, his elementary studies will never have been thrown away. In the nature of things, as Porson said, such instances must of necessity comparatively be rare. The inventor is, too frequently, among the most self-deluded of men, as witness the Patent Offices of South Kensington and Southampton-buildings, and the history of ten thousand disappointments external to them. The weeding down, as it were, of this ingenuity would be no disadvantage to the really inventive class, but would rather prevent their ideas from being confused with the crude, the stale, and the impracticable; and here are lines of definition which may wisely be considered in any provision for teaching. That it does not exclude science is a sign of common sense, because science is an essential element in any improving industry;—chemistry, for example, as applied to dyeing; all metallurgical trades, tanning, curriery, plumbing, glazing, calico printing, and a hundred other industrial processes. Every handicraft, indeed, has its exigencies of this kind varying in degree according to the scale upon which the workman plies his trade, and, these being adequately met will in due season diffuse a general knowledge of the principles necessary to constitute an intelligent and improving workman. Regarded in this light, the importance of technical training which must not be confounded with all the pedantries of some Continental systems for adults not less than for the young, can scarcely be over-estimated, since it must tend to raise practical industry above the common rule-of-thumb principle; for every day's toil is a fresh lesson, and brings with it a fresh incentive. Only, the movement runs a risk, under particular influences, of being schemed out too large and on too desultory a surface. In one respect the cultivation sought to be conferred is practical beyond any doubt; that is, in so far as it stimulates manual dexterity, and what is familiarly called "cleverness," in boys, though it is a way to be very carefully grooved for them, if we would not have a surplus of erratic facility, leading to little or nothing. It frequently occurs that the parents of a youth allow years to elapse before deciding what to do with him; but, if he belong to the industrial order, there are tools which every lad should know how to use, and which he can never regret being acquainted with, quickening as they do his suppleness of hand and readiness in the adaptation of physical strength, confirming him in habits of routine; for, although routine may be obnoxious when it absorbs everything else, no real industry is possible without it,—no regularity, no efficiency, and, therefore, no progress. In factories, of course, a departure from routine lies exclusively within the province of the employer; but in the case of the mechanic, who is expected to know all the details of a complex handicraft, there is room for a certain independence of mind and action, though this, occasionally, may conduce to accidents. Some other points are commonly dwelt upon, and one is the necessity of technical learning on the part of many masters themselves, and the jealousy which they are said, from time to time, to exhibit with respect to the superior training of their workmen; but these are circumstances which, if they exist, belong to an obsolete period, and will speedily wear out. It is the same in a great degree with the evils of the apprentice system,—the confused and cumbersome state of the law; the irreconcilable grounds of dissatisfaction often arising on both sides; and the disjointed nature of the teaching. Thus, many masters can only teach part of a trade, as, for instance, country coachmakers, who have the bodies built in towns, and simply undertake to dress and decorate them. Here the technical knowledge acquired from experience is necessarily limited, and a carriage-builder's apprentice, nominally so styled, may, at the expiration of his term, know hardly anything of carriage-building. The most important point of any is, however, the gradual recognition by the working classes, and especially, be it marked, by those which are already the best educated, that there is a trying race before them, that long vistas of study must be contemplated, and that the world is moving upon something more than an easy level, with nothing but emptiness behind, and nothing but monotony in front. It is technical teaching which is to render the workman of the future worthy of his work, and capable of it.

CAST AND WROUGHT IRON GIRDERS, AND THEIR APPLICATION TO BUILDING PURPOSES.

ARCHITECTURAL ASSOCIATION.

AN ordinary general meeting of the session was held last Friday evening, the 28th ult., under the presidency of Mr. G. H. Birch, when Messrs. Robert Foster and H. B. Buckley were elected members.

Votes of thanks were accorded to Mr. Edward C. Robins for accompanying the members of the Association over the New School and Clergy House attached to St. Andrew's Church, Wells-street; and to the Rev. Benjamin Webb, M.A., for permitting them to inspect the building and enabling them to see a number of objects of interest connected with it on the occasion of their recent visit.

Mr. S. Flint Clarkson (secretary) announced that the next visit would take place on June 5th, (Saturday), the place selected being the New Floating Swimming Baths adjoining Charing-cross Bridge, after which it was proposed to visit the New Offices of the London School Board on the Embankment.

Mr. Richard Moreland, jun., then read a paper "On the Detail of Cast and Wrought Iron Girders, and their Application to Building Purposes." The conditions of equilibrium under which the safety of a structure consisted were, he said, in the first place, the effect of the attraction of the earth, or, in other words, the weight of the whole structure, including the loaded supports. The forces generated by this total load being resisted by the supporting pressures or the resistance of the foundations, the strength of structure should be such that the whole of it should be in equilibrium when it was loaded with its maximum weight, so that the greatest stress on any given portion or piece of the structure should not deform that particular portion. The stress in each part must not be greater than the material could bear with its ordinary working load with its proper factor of safety. Though the greatest stress which might come upon each portion might not cause immediate fracture, yet it must be of such strength that it might not suffer by fatigue or disintegration of its particles, whereby such injury might be done to it as would cause its fracture in the course of time. The component parts of a structure should not only possess the element of strength, but also that of stiffness and rigidity. The proportion of its dimensions should be such that it should not be capable of being deformed, twisted, or put out of shape. The general stability of a building depended on the way in which it was tied and bound together, not only by its internal framework, but also its main lines of masonry. For the last thirty years girders had been employed largely in the construction of large and extensive buildings, and had been carried to considerable spans, and support very great loads, much greater than the original structures where "wood-beams" were employed. Girders were maintained also in equilibrium by their own weight, and the load which they supported being acted upon by the attraction of the earth. The stability and strength of a loaded girder depended on the equilibrium that must exist between the forces occasioned by its own weight and the load which it supported, and the sum of the molecular forces and reactions which resisted them. They had still the "law of gravitation" acting on the girder and the cohesive nature of the material, and its resistance to crushing action against that force. Girders, by supporting loads in structures, played a very important part in their construction; considerable loads were necessarily accumulated upon them from large areas of loaded floors, and so discharged great weights upon their supports, either columns or piers in walls, so that it became important to consider the nature of the support as much as the design and construction of the girder. The action of the load on a girder produced vertical forces upon its supports, and at the same time tended to shear the girder at these supports. The shearing strain, as it was commonly termed, varied as the load was concentrated or distributed. The relative strength of a girder depended on the way in which it was loaded and supported. A girder would carry double the load if equally distributed that it would if it were in the centre. It was important in large structural girders that the weight of the girder itself should be considered as a portion of its load. Wrought-iron plate girders had merely a web and two angle irons at each flange; the depth might vary from 12 in. to 3 ft. Of course they could be made of a less depth than 12 in., but then they were in comparison with rolled iron girders, and it was then a matter of judgment which should be used. The web might be varied in thickness from $\frac{3}{16}$ in. to $\frac{1}{2}$ in., or for the deeper girders it might be thickened to $\frac{5}{8}$ in. The angle-irons might vary from $3\times3\times\frac{3}{8}$ to $6\times6\times\frac{1}{2}$. These girders of light loads were rigid and simply constructed. They did not require stiffness up to 15 in.; beyond that they required stiffening according to their length and depth, and the way in which the load was distributed upon them. The portion of the web nearest the flanges partook to a certain extent of flange strain, and might be taken into calculation from the flange area. Where the girder supported floors on either side of it, the upper flange might be kept nearly level with the top of the joists; the floor-boards being laid immediately over; the girders being thus immersed in the construction were stiffened sideways. Tie-rods should be carried from girder to girder through the web, and then into the wall, as the mere fastening of the timbers to the girder was not sufficient to take side strains. The rivet-holes securing the angle irons to the web need not be less than 6 in. pitch; the rivets from $\frac{3}{4}$ in. to $\frac{7}{8}$ in. diameter. Flange girders were similar to the web-plate girders, with the exception of having flange-plates riveted upon the angle-irons at each flange; but the rivet-holes which were made in the angle-irons for the purpose of securing the flange-plates to them reduced the strength of the angles, and so an addition had to be made to the flange-plate to compensate for the reduction of rivet-holes in both angles and flanges. The loss was calculated at about 17 to 18 per cent. The plate-girders being of equal section throughout, a certain amount of metal was wasted; whereas, in the flange-girders, the flanges and angles could be so arranged as to make the sections more proportionate to the strains which passed through them; so that this fact tended to counterbalance the reduction caused by the rivet-holes already mentioned. With regard to box-girders, these were used when a considerable width was required in proportion to the depth. There was no theoretical advantage of a box-girder over a plate-girder; but the only advantage that could be claimed for a box-girder over a plate-girder was that in isolated positions, or where there was a possibility of side strain acting upon it, the webs and angles of the girder act as flanges to resist such strain. Box-girders being usually of a greater width than plate-girders, the flanges thus made the girder stiffer laterally. Plate-gussets in large box-girders should be used at close intervals. In all three classes of girders the webs should be graduated, and become thinner towards the centre, being the thickest at the ends. The stiffness in box-girders might be placed with advantage inside the web, and so be riveted to both angles and web, the ends of the stiffener touching the inner side of both flanges. It was advantageous sometimes to use two plate-girders instead of a box-girder, and bolt them together; this was very useful for slinging purposes, as the bolts could be made to pass between the two girders. In respect of the discharge of weight from the end of girders, where considerable loads rest on girders, it was important to find the amount of load discharged on each support; and very often the accumulation of weight became very intense on one support. In those cases where a pier, or a sufficiently large one, was not available, the discharge should be taken by a girder resting upon the line of wall of sufficient length and strength to distribute that discharge on the wall, which it might be capable of supporting; stones, unless of considerable thickness, could not be depended upon. A cantilever or semi-girder, was a lever which was a beam fixed at

one extremity only and supporting a weight at the other; it was subject to transverse strains. The upper edge being extended, and the lower compressed; and it had a tendency to overturn the structure to which it was fixed. Strains in webs were difficult to define with accuracy; they might be vertical, diagonal, and curved. If vertical they must be diagonal, for the weight or load placed on a girder exerted a vertical force in consequence of the attraction of the earth, and this was generated into horizontal forces at both flanges, so that the web must be under diagonal strains, because the vertical force was converted into a horizontal one. The primary idea of a web might be taken from a single series of bracing, and supposing those braces to be crossed, and additional ones added so as to fill up the whole of the vacant space, there would then be sufficient iron in the braces to make two webs in consequence of their over-lapping, so that the continuous web would always be more advantageous, as regarded strength, than the bracing in lattice girders, provided it was convenient to employ it. Shearing strain at the centre of a girder supported at both ends, and with the load equally distributed, was nothing, and at the other sections was the sum of the weights between that section and the centre. The shearing strain at any section was the pressure transmitted to the abutment through that section, and was equal to the lines of ordinates of a triangle, and the sectional area of the web should vary accordingly to that ratio, being thickest at the ends and thinnest in the centre. The thickness of the flanges varying in the form of a parabola, being thickest in the middle and thinnest at the ends. All structures which spanned a space either thrusted their supports from each other, or dragged their supports towards each other, or pressed their supports by vertical forces. In the first case might be included brick or masonry arches, and other arched structures in iron or wood. The spring or skewback on which the arch was supported was inclined in proportion to the span of the arch, and the reason why arches maintained their position was, in the first place, the resistance of the material to compression, and the maintenance of its stability, and the resistance of the spring or the skewbacks to the thrust imposed upon them. However, in the case of semicircular arches, the springing being of course horizontal, these arches discharged their own and the weight they supported downwards in a vertical direction; but all arches whose skewbacks were inclined to act as a wedge did have a tendency to drive their supports outwards. The arched ribs of Blackfriars Bridge, and the Victoria Bridge at Chelsea, might be cited as examples of arched ribs composed of wrought iron, and Southwark Bridge as an example of arched ribs of cast-iron. Suspension-bridges, on the other hand, were a series of rods or chains slung from piers, and securely anchored to the side of the space to be spanned. One of the earliest bridges was the Menai Bridge, by Telford, with a central span of 580 feet, a versed sine of 50 ft., and two side spans of 258 ft. and 199 ft.; the height from high-water mark to the under side of the bridge was about 100 ft. Another example of a suspension-bridge was the one which was built in 1867 by Mr. John A. Roebling, an American engineer, over the river Ohio, at Cincinnati, of 1,057 ft. span, this having, in addition to chains, inclined rods from the piers to the platform to keep the bridge free from undulatory motion, which was caused by the passage of traffic across it. Another example might be given of a suspension-bridge which was designed by Mr. R. M. Ordish, in 1857, over the river Moldan, at Prague; the span was not very great,—about 492 ft.; but he had introduced inclined suspension-rods from the piers to a strong continuous girder which supported the platform on either side. These rods or chains maintained the girder in balance; the suspension-chain was also carried the whole length of the bridge, and attached by vertical rods to it. This method of construction made the structure more in the form of a girder than a suspension-bridge. The first two straight rods were attached to the tower, and slung the bridge at 82 ft. from the centre of each tower; the second two slung the bridge at 164 ft. from the towers, leaving a space of 164 ft. to be supported by two further chains, which met each other at the centre of the suspension-chain proper. No wave or undulation could thus be produced, as the principal portion of the supports were suspended by straight rods. The main and side span inclined links were all attached to the archway at five points, dividing the girder into six lengths; the side spans were supported by the chains at one point 82 ft. from the centre of the pier; the other straight inclined link went to the side span at the point of support; the width of the roadway was 31 ft., the carriage-way 20 ft., and two footways 5 ft. 6 in. each. The chains were anchored on one side in the rock, on the other was an artificial foundation; the main chains were of flat homogeneous steel, 14 ft. long and 4 in. by 1 in. cross section. Each link was tested to 22 tons per square inch without permanent set. The main girders supporting the roadway were 7 ft. deep; the cross girders were 32 ft. long and 2 ft. deep, being placed at intervals of 6 ft. 10 in. They had the combination of both arch and suspension-bridge in the stupendous structure which Mr. I. K. Brunel erected for the Devon and Cornwall Railway Company over the river Tamar, at Saltash, commonly known as the Royal Albert Bridge. It not only showed boldness of conception, but also great ingenuity of construction; and in it they had an illustration of the fact that in the arches the whole of the metal supporting the load was in compression, and in suspension-bridges the whole of the metal supporting the load was in tension. By the combination of the arch and the suspension-bridge, they got a structure independent of any thrust or pull, the whole of the strains being inherent in the structure itself, which transmitted its pressure, due to its own weight and that of its load, in a vertical direction upon its supports. The bowstring system of girders was that of the construction, where one member was horizontal and the other curved upwards, forming an arch, or downwards, forming a suspension flange. The design of the Royal Albert Bridge was to keep the upper member sufficiently high to enable a train to pass beneath it, as the upper tube was the whole width of the bridge, but in ordinary bowstring bridges, where there was a bow on each side, the lower member was made horizontal. A bowstring girder, in consequence of its uniformity of strength, was the lightest of all girders. The tension-rod or tie-beam received a tension equal to the horizontal thrust of the bow, and a bending action due to the load between any pair of suspenders. With an unequal load, some of the suspenders might be columns in compression, and some ties at various times, as the load was varied. If the girder was without diagonal braces, then its strength would depend on the stiffness of the bow. The thrust on the curved flange of a bowstring varied as the secant of the inclination. It was stated that the first bowstring girder was designed by Alexander Nasmyth in 1796, the father of the inventor of the steam hammer. It was a bowstring bridge of 3,000 ft. span. Menai tubular bridge was another fine example of girder construction, and was one of the earliest applications of wrought-iron tubular construction to bridge-work. But the first application of wrought-iron girders was at the bridge at Chalk Farm over the North-Western Railway, erected in 1846, by Mr. R. Stephenson. As to truss-girders, wooden beams might be trussed to carry considerable loads with iron truss-rods. The proportion of iron required for a truss, as in ordinary lattice-girders and that of the Bollman truss, and that of the Fink truss, was as 262, 370, 396. These trusses semed to have no advantage over an ordinary lattice-girder, provided that they were made of equal depths. Where girders were unequally loaded, and supported at both ends, the tensile strain on the flanges might be discovered by projecting lines at the centre of gravity of each of the weights as ordinates, these lines being proportioned to the weight discharged upon these points; if from each of these points lines be drawn to the end of the girder, forming a series of triangles, the apex of each being the points already referred to in the line of pressures; and if these lines be projected, and the distance of each intersection of all the lines be taken and added to the apex of each triangle in the same line of projection, then the curve drawn through the points thus obtained would be equal to the total strain produced upon the girder by the applied weights. Mr. Stephenson's first idea of designing the tubular bridge was to conceive two cast-iron beams, of equal flanges, 16 ft. wide and 30 ft. deep, laid side by side, the whole of the metal in the flanges being transferred to the space between the webs. This idea was ultimately worked out in the section of the bridge now in existence. The shearing strain in girders, supported at both ends, was decreased as the centre was approached. The deflection of smaller beams, from their own weight, was as the square of their lineal dimensions. In designing wrought-iron girders, it was important to collect the whole of the metal as far away from the neutral axis as possible, and to accumulate it in the flanges, leaving the web and its stiffening to take up the intermediate strains as might be required. The resistance that cast-iron girders gave to a compressive strain was from 40 to 42 tons per square inch as a crushing strain, from 6 to 8 tons for a tensile strain, so that the area of the flanges of cast-iron girders should be in this proportion—about 6 or 7 to 1. The upper flange, however, where the girder was isolated and not held in position by the structure itself, should be proportionally wide according to each particular case, as the upper flange had to resist flexure which would possibly deform it before compression of the flange could occur; but where the web and upper flange were supported by the structure itself, as in the case of arches and flooring, the theoretical proportion might be taken. Cast-iron girders should not be proved beyond their working strain if they were to be used afterwards. If it was desired to see the effect of the strain upon the girder, select a few and destroy them by the proof; the facts of the case would then show the conditions under which the girder existed. It was not advisable to use cast-iron girders of a greater length than 25 ft., and depth of 1-20th span, to carry considerable loads. Wrought-iron became as economical and safer; and also in the event of girders being heated to redness during a fire, wrought-iron was likely to stand the cooling action of water poured on it better than cast-iron. After the fire at Hadley's Flour Mills, in Thames-street, it was discovered that the great portion of the girders that had fallen were shorn off close to the bearing, and this could not have occurred if there had been any particular load upon them. The girders had evidently been red hot in the fire, and the bearing being immersed in the wall, partook of the wall temperature, so there was unequal temperature set up in the girders, and the water which was used to put out the fire cooled it down at the junction where the varying temperatures occurred, and so fractured the girders at that place; this would not have occurred if the girders had been wrought-iron. It was important that girders, if they had to withstand fire, should be encased in either plaster or wood. Cast-iron would, no doubt, withstand the heat as well as wrought-iron, but would not bear any shock during the time that it was kept heated. In a diagram before them he showed a design for encasing wrought-iron girders completely in concrete. The girders were formed continuously from one end of the building to the other, and were made in two parts, and one was fixed on either side of the columns. Each of them was composed of a simple angle-iron, $5 \times 4 \times \frac{1}{2}$ in. for each of the flanges, and the bracing was composed of $5 \times 5 \times \frac{1}{2}$ in. angles for the first bar, and $4 \times 4 \times \frac{1}{2}$ in. for the second bar. The girder was thus an open braced parallel girder, 15 in. deep, the concrete being $2\frac{1}{2}$ in. thick on both top and bottom, so that these girders were immersed in a concrete block 20 in. deep. Bow-string girders, 10 ft. 9 in. long, 15 in. deep, were placed one over each column, and three between; the girders were 15 ft. long, and 12 ft. apart from centre to centre; the bow-strings were thus 3 ft. 9 in. apart; they were composed $3 \times 3 \times \frac{7}{16}$ in. angle-iron for the top and bottom flanges, with $3 \times \frac{7}{16}$ in. flat iron to connect them together. The advantage of this arrangement was that the block of concrete was not separated by the webs of either the main or transverse girders, but adhered through the braces; an effectual coherence was thereby made, and the whole of the iron composing the floor was immersed in one solid block of concrete from one end of the building to the other; this floor was calculated to carry a load of 3 cwt. to 1 ft. superficial. It was proposed that the columns should also be cased by using a sheet-iron cylinder made in three segments, and working on hinges, and putting it round the column with a space of about 3 in. all round, between the interior of the casing and the outside of the column, and then to pour some fire-proof material into this space, either cement or plaster, and when that was set to remove the casing. This was designed for a warehouse for inflammable materials. It was believed that this would effectually prevent the spread of fire, as the whole of the iron would be encased.

It was found that when girders were deflected, the lines which were originally vertical and

parallel in the web, would not be vertical, but would form wedge-shaped segments on the girder; but all the lines were straight, so that the two lines at the ends of the girder, if projected, would meet at some distance from the girder. Now this same effect took place only in another way in columns. The pressure, with the greatest care possible, could never be applied to a column of 10 diameters to length, so as to transmit the strain through all the particles equally, so that one portion strained to a greater extent than another, and bent the columns from the ends by the action of the pressure. This was exactly similar to the girder being pressed in the centre and becoming deflected, and the under-side of the girder becoming unparallel. Of course the point of flexure in the column would be a point opposite to that where the strain occurred. A fine example of a curved girder were the arched iron ribs of the St. Pancras Railway Station. The arch was 240 ft. span internally, by 96 ft. high from the springing to the top. From the springing to the under-side of the tie-girder was 6 ft. The tie itself was composed of girders which were supported on columns, and this supported the whole of the floor of the station. The ribs were 6 ft. deep and 18 in. in width, tapering to 2 ft. 6 in. at the base; the depth was one quarter of the span; the lower part of the ribs was about 20 ft. high, of solid plates; and the rest was composed of open brace-work. It was designed by Mr. H. W. Barlow. The whole construction might be taken as a girder, the rib forming the upper flange, and the tie forming the lower flange, without any immediate bracing whatever. Any segment of this rib might be assumed to act in the form of a girder; and, suppose one-half of it to act as a prop or strut, the other portion would act as a girder, and the line of equilibrium would not pass outside the line of structure; and, owing to the form of the arched rib, portions of it might act as girders, one side being in compression, and the other in tension, as the case might be. The line of compression might pass outside the structure at the base, one flange having to be sufficiently strong to take the whole compression. The strength in the crown was greatly in excess of that which was really required. The structure gave a very good example of the arched rib with a tied base, without internal bracing, the bracing being within the rib itself. Where a considerable concentrated load was discharged upon piers in a building by a girder being placed over them, and this girder being supposed to discharge the strain equally on each of the piers, then the sills of the openings between the piers should be girders also, or inverted arches. The base of the pier would receive just as much pressure as the top of it, making, therefore, an unequal discharge of pressure in the structure beneath, and between the piers. A case in point might be noticed. The window-sills at St. Paul's Cathedral were bent in an upward direction from the pressure being discharged on the piers at the side, and not between the piers, as it should be; whereas, if some inverted arches had been placed under the sills to discharge the weight, this would not have occurred. This was also the case with foundations. Walls with continuous foundations should not have isolated piers merely laid upon the line of structure without having inverted arches or girders. Foundations should never act as girders; the whole of the foundations should be in compression. The only way to make them act as girders was to put a girder on the top of them, or some inverted arches over the substructure. In granaries and stores considerable loads had to be taken by the side partitions and walls,—so much so that there was often a greater load upon the walls and partitions than upon the base or floor of the structure. The loads being very unequally distributed, especially where the spaces were being filled or emptied, the author had designed structures for testing a side strain equal to from 10 to 15 cwt. per square foot at the base of the structure by employing thick corrugated iron as a skin or basis for the partition, with a system of joists or girders on either side, and these being bolted through the corrugated iron, so that there was a system of girders on either side of the corrugated iron. Ties acting as columns at the same time, were placed at intervals of from 10 ft. to 15 ft.; these passed through the walls of the structure in the case before them. There was a series of spaces 40 ft. square and 50 ft. in height; these were divided by two cross partitions, supporting in each space of 20 ft. square a load of about 270 tons, and as one space was filled another might be being emptied, so that each side might be alternately put in compression or tension, as the case might be. Each tie, indeed, had to act as a tie-rod, as a column, and as a girder; it had to act as a tie and a column, because of the alternate extension or compression, whether the space itself was filled, or the adjoining space was filled; it had to act as a girder, because when the space was being emptied, the drag of the grain downward acted upon the tie with the whole force of the descending mass; the external walls had to be tied with longitudinal tie-rods in the same line with the ties, within the spaces, by having ties built in or bolted to the wall; the walls only had an outward thrust, and were not acted upon in two or three directions, like the partitions. The corrugated iron was about ¼ in. thick, and 5 in. flute; the flutes were placed horizontally, and the spaces between the first set of girders, which were vertical, were 3 ft., and the corrugated iron was made in a continuous sheet right through the building, both vertically and horizontally; the vertical girders were made continuous on either side of the corrugated iron; and the main girders which supported these vertical girders were horizontal, and also ran the whole length of the building. They acted not only as girders, but as ties to the wall: the corrugated iron also assisted them. Tie-rods were taken from these girders, and carried through the building continuously, and strongly fastened to the walls. This construction was light, and exceedingly strong; it had been in use for several years, and no flexure had taken place, loads of 15 cwt. being discharged at the foot of some of these structures.

The President said there could be but one opinion with regard to the value of the paper just rear to the meeting. It showed them the necessity of studying the subject for themselves, for there were very few of them who had not met with the question of iron and its application to building purposes in the course of their practice.

Mr. Bancroft, in speaking of the construction of the Menai bridge, thought that the author of the paper had not given credit to the late Sir William Fairbairn in regard to the share that he had in that work.

Mr. Robertson was glad that the subject of iron construction was especially treated in some of the classes attached to the Association, for the tendency was still very much to neglect its study, especially by the younger members of the society, who were apt to be drawn by the more attractive branches of the profession.

PRIVATE BILLS IN PARLIAMENT.

THE state of private Bill business in resuming after the Whitsuntide holidays may be epitomised.

There were 262 Bills on the general list at starting, fourteen of which did not reach the first reading, which leaves a residue of 248. The Lords commenced proceedings with sixty-seven Bills, all of which have been dealt with. In rejecting a Bill, my Lords find euphemistically that "it is not expedient that the parties should proceed," or some such gentle formula. Of this class, and of Lords' Bills withdrawn, there are seventeen, leaving fifty Lords' Bills for the Commons to deal with. This leaves 231 Bills on foot. The Commons' committees have these fifty Lords' Bills to consider, and there are still twenty-one Commons' Bills that are not yet reported. In the Commons thirty-eight Bills have been withdrawn after first or second reading, and eleven have been rejected on preamble. This number includes two Bills in respect to which a needed dispensation from Standing Orders was not granted.

The first committee to resume its sittings since the recess was Mr. Knight's on Group E, the Bills before the committee, which were taken together, being the Crosshill Burgh Extension, and the Glasgow Corporation (Municipal Extension, &c.) Bills. Tuesday, the first sitting since the recess, was the ninth day of hearing. The Crosshill Burgh Extension Bill is opposed nominally, or really, by the Corporation of the City of Glasgow; the Caledonian Railway Company; the Caledonian and Glasgow and South-Western, and Glasgow and Kilmarnock Joint Line Committee; the Commissioners of Supply of Lanarkshire; the Govan Statute Labour Road Trustees; the Royal Incorporation of Hutchinson's Hospital; and others. The Glasgow Corporation (Extension, &c.) Bill is opposed by thirteen petitions, but is also fortified by six petitions in favour of the Bill. The petitioners in opposition include the Commissioners of Supply of Lanarkshire, and of Renfrewshire; owners of property in Lanarkshire, and in Renfrewshire; owners of property in Pollokshaws; magistrates and commissioners of police of the burgh of Crosshill; Cathcart Parochial Board; the Cathcart School Board; the Govan School Board; the Caledonian Railway Company; and the combination of railway interest that oppose the Crosshill Bill; with other petitioners. The most eminent counsel at the Parliamentary bar are retained on one side or the other, ten or a dozen Q.C.s and juniors holding briefs in the case. The Crosshill Extension is a comparatively small affair; by the Glasgow Bill it is proposed to swallow up whole the Crosshill Burgh, including the proposed extension. The magistrates and commissioners fight for existence, and it might almost be supposed as hopelessly as Denmark fought against the overwhelming odds that wrenched from her Schleswig and Holstein. The case, however, is not quite so bad as that, the county authorities of Renfrew and Lanark giving their powerful support to the Crosshill petitioners. The opponents of the Glasgow Bill have a decided opinion that it would be a readjustment of "local taxation" in the wrong direction to make the people of Crosshill jointly liable for Glasgow Corporation obligations, incurred, it may be, half a century ago, for objects in which they have no interest, and from which they can derive no benefit. The Glasgow Bill is regarded with alarm by the authorities and inhabitants of other outlying burghs, the boundaries of which abut upon those of the city of Glasgow. Such, for instance, as the burghs of Partick, Kinning Park, and Govan. The little burgh of Crosshill is attacked first, and if successfully, it will only prove, probably, the commencement of a policy of annexation, and the other burghs will be swallowed in succession. The committee give unmistakable evidence of being aweary of the contest. The evidence on the Crosshill Bill was first taken; the Glasgow witnesses were heard in part on on Tuesday, the 25th ult. Concerning one of them, the chairman of the committee remarked that it was "a pity the promoters had brought the witness all the way from Glasgow for all the good he had done them." Another Glasgow Corporation witness cut a sorry figure under cross-examination by Mr. Venables, who confronted him with certain pamphlets he had formerly written in the interests of the Burgh of Crosshill, and diametrically opposed to the evidence he was now giving. The questions were put whether the circumstances had changed materially? Whether witness was in the pay of Crosshill then, and of Glasgow now? We forbear from giving his answers, except that some one else had prepared the pamphlet, and that he had allowed his name to be put to it without due thought.

The following unopposed Bills were passed through the committee stage:—Fishguard Railway; Ingleby, Bilsdale, and Helmsley Railway; Boston and East Coast Railway and Pier; Gravesend Terrace Pier; West Lancashire Railway; Romford Canal; and the London, Brighton, and South Coast Railway Bill.

THE NEW TEMPERANCE HOSPITAL.

THE Board of Management of the London Temperance Hospital, Gower-street, in order to meet the numerous requests for participation in its benefits, have succeeded in purchasing, as a site for a new and larger hospital, a freehold plot of ground, on the north side of St. James's Chapel of Ease, in the Hampstead-road, near the junction of the Euston and Tottenham Court-roads, and about five minutes' walk from the Gower-street station of the Metropolitan Railway. The site itself, which covers a superficial area of 8,554 ft., and has a frontage to the Hampstead-road of 72 ft. 6 in., has been secured at public auction for 3,300*l*. It is proposed to erect a hospital to contain from 80 to 100 beds, placed for sanitary means, in wards of small dimensions. The best modern system of ventilation and drainage will be employed. There is an open space of about four acres in the rear. The Board propose to raise a building and extension fund of 20,000*l*.

Japanese Metal Work.—Some very fine metal work brought from Japan by Mr. Mitford, the author of "Tales of Old Japan," has been added to the South Kensington Museum. One specimen is an eagle formed in hammered iron.

INVERCAULD, BRAEMAR. VIEW IN THE LOWER HALL.

INVERCAULD, BRAEMAR, ABERDEENSHIRE.

THE additions and alterations to the mansion-house of Invercauld have been in progress for some few years past, and are now almost completed, with the exception of the decorations. The works have been carried out from the designs, and under the superintendence, of Mr. J. Thos. Wimperis, architect; the contractors being Messrs. Warruck & Daniel, of Aberdeen, who have executed their work in a very satisfactory manner.

The style of the extended building is the Scotch baronial. The old foundations have been used, and the old mansion is preserved as much as possible; in some parts two or three stories have been added; while the most important feature, and one that gives grandeur to the whole, is the carrying up of the tower to a height of about 70 ft. to the battlements, together with the staircase and other turrets, and a flag-tower. The tower measures on plan 47 ft. by 27 ft.

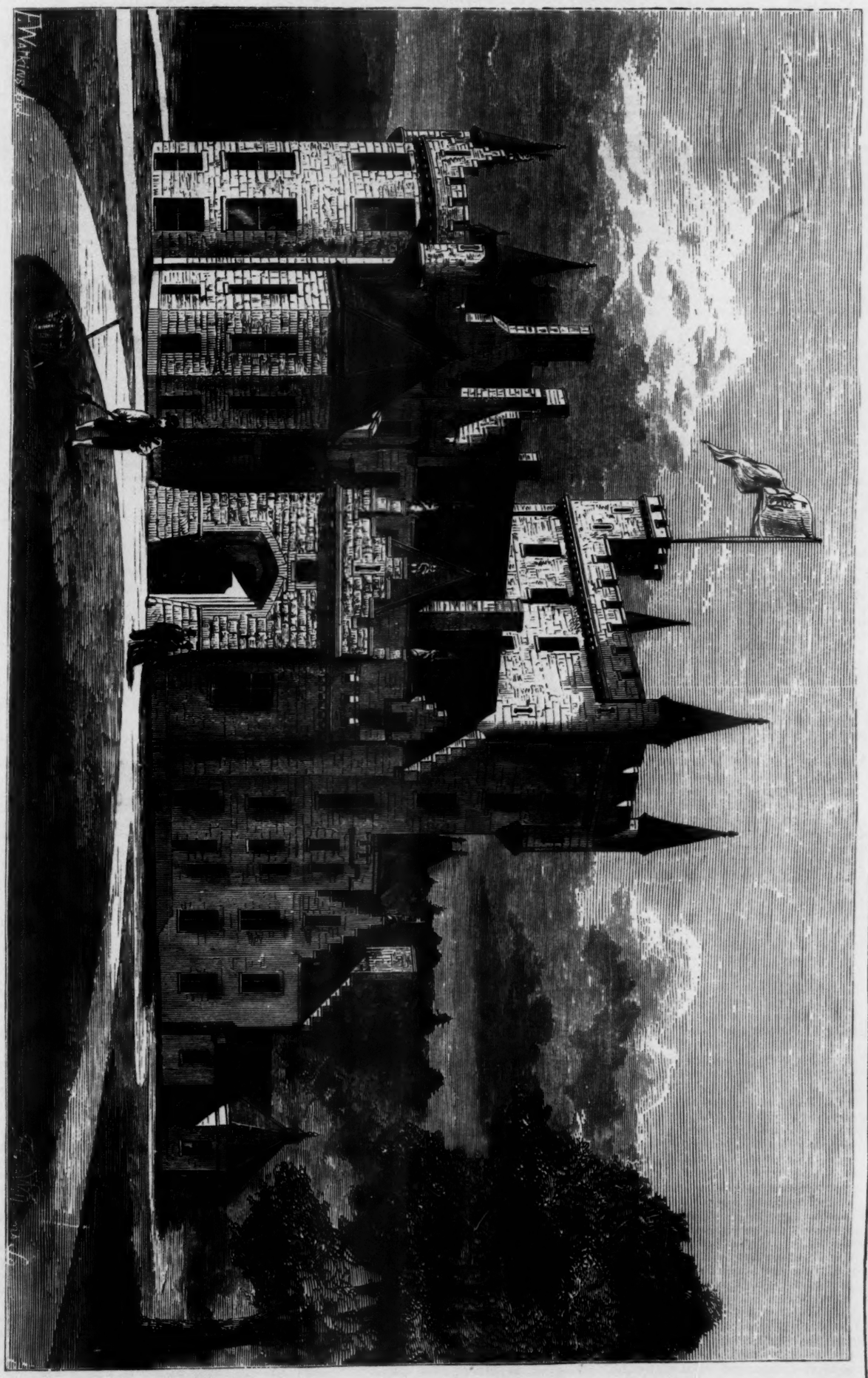
The new entrance doorway opens into a vestibule, which is about 14 ft. square and 20 ft. high. It has an open timber roof, with circular angle ribs springing from carved stone corbels, meeting in a large pendant in the centre, from which lamps will be suspended. Swing-doors lead into the lower hall, of which a view is given, and this communicates with the upper hall by a flight of steps about 12 ft. wide. Both these halls have timber roofs. The size of the lower hall is 22 ft. by 22 ft., and 22 ft. 6 in. high; while the upper hall is 33 ft. by 15 ft., and 15 ft. 6 in. high. At the end of the upper hall is the drawing-room, from the windows of which some of the most beautiful and romantic views of the valley of the Dee are visible, and which vie with almost any in Scotland. The size of this room is 34 ft. by 22 ft., and 15 ft. high. The old dining-hall is preserved, and is at a lower level, and is approached by a handsome pine staircase from the upper hall and along the garden corridor. The whole of the masonry is of blue granite, quarried on the estate about four miles from the mansion, and is finished externally with rough hammer-dressed face.

Polished granite columns and chimney-pieces have been used in the interior, and the windows of the hall and other portions have been filled with heraldic glass by Messrs. Gibbs & Moore.

The interior fittings, moulded and carved, are of pine-wood cut upon the estate, and chiefly from the forest of Ballockbuie, and were in great part prepared in Aberdeen.

At the latter end of last year her Majesty the Queen, accompanied by Princess Beatrice, paid a visit to Miss Farquharson, of Invercauld, and inspected, with much interest, the improvements and additions to the mansion-house. The house is a conspicuous feature in the view from the summit of Lochnagar. Craig Clunie and the Lion's Face, directly opposite the mansion, on the south side of the river, would of themselves suffice to redeem the landscape.

The dining-room is of historical interest. The chiefs of the clans assembled there when the Earl of Mar raised his standard, at Castleton of Braemar, in 1715. His address calling out the clans was dated from Invercauld House. This was the last time on record when the "Fiery Cross" was sent through the Highlands. The Earl of Mar was feudal superior over the district, and induced the Laird of Invercauld (the great-great-grandfather of the present proprietor), much against his will, to accompany him to England with some followers. He subsequently distinguished himself at Preston, where he held a bridge with a hundred men against considerable odds. On the failure of the expedition he was taken prisoner, and lodged in the Marshalsea Prison, where he remained until 1717. At the time of the rising in 1745 he was still alive, being seventy-six years of age, but did not side with the Jacobites. The clan, however, went under Farquharson of Balmoral and Inveroye, and Farquharson of Monaltrie. According to the "Annual Register" of the time, the clan numbered 700 at Falkirk, and only 300 at Culloden, and it is believed that few of the number ever returned to their homes.



INVERCAULD, BRAEMAR, ABERDEENSHIRE.—MR. WIMPERIS, ARCHITECT.

NEW PUMPING-ENGINES FOR ST. PETERSBURG.

THE City of St. Petersburg New Waterworks Company, having contracted with Messrs. Laidlaw & Sons, engineers, Glasgow, for the construction of the pumping-engines, by means of which they are to supply a large population with water, a pair of these fine pieces of machinery have just been finished, and are all but ready for shipment by Messrs. Donald Macgregor & Co., of Leith. Three important districts of the Russian capital,—Wassiliostroff, Vieux Petersburg, and Viborgskaja,—it seems, have hitherto been dependent for their water supply on the ordinary barrels drawn by horses; but now it is intended, by using a pair of powerful pumping-engines for each district, to draw water from the Neva, and thus bring it within reach of the inhabitants. The pair of engines just completed, and which are to be erected in the Wassiliostroff district, are on the horizontal condensing principle, having a combined nominal horse-power of 130, with double-action pumps, double-beat Cornish valves, and will be worked at a high degree of expansion, with a view to the economy of fuel. In order to efficiently carry out this purpose, the expansion gear has been constructed on a somewhat novel plan. The engines are furnished with 30-in. cylinders, and are of 4-ft. stroke. The ground forming the site on which the two new pumping-engines are to be erected being of comparatively recent formation, it has been found necessary to use piles to afford a secure foundation,—a necessity which will be more apparent when it is stated that the engines are about 36 ft. in length, whilst the weight of each sole-plate is about 10 tons. To Mr. John Thomson, formerly manager at the Alliance Engine Works and Foundry, and now a partner with Messrs. Laidlaw, belongs the credit of designing these species of mechanism. The contract price of the whole of the engines, we are informed, amounts to the large sum of 250,000*l.* The engines yet to be constructed will be less powerful than those ready for shipment,—they will only be each about 80-horse power combined, and 50-horse power nominal.

A CITY OF THE FUTURE.*

LETTERS FROM SHAKSPEARIA BY SCAMOZZI SMITH, ESQ., ARCHITECT.

Written to his Friends in London during the Summer and Autumn of 1915-16.

MY DEAR ——,—I must now fulfil my promise to give you some account of the style of architecture prevailing here, which, as an architect, you will naturally be impatient to receive.

This new nation have made no attempt at the invention of a new style, but have adopted and made their own the styles which they found ready to their hands: I say styles, for they have cast none away. In fact, while you in England, divided into two hostile camps, have been pitting style against style, with all the rancour of political faction, they have been quietly and unitedly rearing to perfection for their various uses three several styles, viz., an Italian, a Romanesque, and a Gothic. These, though clearly definable, are yet so broad that they touch each other, and make perfect harmony among the different buildings and parts of the city. By the exercise of an enlightened spirit and creative energy in the treatment of the Italian and the Gothic—the trabeated and the aspiring styles—they have unconsciously greatly lessened the gap between them, and rendered the intermediate style—the Round-arched or Romanesque, which they have evolved from the Round-arched style which preceded the Gothic of Europe—a complete link between them, joining up to both. The Italian has been so thrilled with the picturesque that it quite reaches the Romanesque on one side; while the Gothic has been so sobered, chastened, and ennobled by a more rational, religious sentiment, that it perfectly harmonises with it on the other. They not only touch,—they are a sort of trinity in unity: each style has imbibed so much of the others, and all are so much assimilated to the place, that they appear, in a broad view, but as one comprehensive and varied style, embracing so many subordinate manners of design, and all the known principles of construction and means of roofing over space,—one great, broad style, which has a constant tendency to simplify itself and become more homogeneous.

If such it may be considered, where is the style that for richness, copiousness, and capability can compare with this style?—a style rich in the spoils of all times and all countries; with ideas from the east and from the west,—a style in which every beautiful feature or idea in all ancient, Mediæval, or modern style re-appears intensified and more beautiful than ever. What is excellent and beautiful in all these has been, as by a sure chemistry, extracted, while what is defective has been allowed to fall. It reminded me of the movement of the Caracci.

In selecting their style in any given instance, architects are determined by the purpose of the building: ecclesiastical edifices are almost always Gothic or Romanesque; civil, municipal, and commercial buildings are Classic or Italian; but all styles are so rationally treated,—so influenced by local considerations of material, scenery, and climate, so thrilled by the spirit of the time and occasion, that no antagonism anywhere exists. Nothing is out of place. Each building seems just what it should be, and where it should be. Nor could you imagine it otherwise than it is without introducing a false image to your mind. I have seen at one end of a street a complete Florid Gothic church, and at the other an Austral-Italian palace, affecting the grandeur and severe simplicity of the Athenian temples, and yet detected no discordancy in the street; so artistically have the buildings been united by intermediate edifices.

The way some streets have preserved their harmony I am told is this:—The public buildings, churches, &c., having been erected first in different styles, have operated as key-notes to the rest,—the private ones,—which have been filled in afterwards, and become the means of uniting them, till all the parts, various as they may be, are held together by an invisible thread of gentle transition.

Though no absolutely new style has arisen, new and beautiful designs are everywhere seen,—

> "New as if brought from other spheres,
> Yet welcome as if loved for years."

Welcome, not only because they contain the old familiar elements as well as the new, but because they are beautiful as well as new,—because along with novelty are combined æsthetic beauty and structural propriety and sufficiency, which must all unite in the formation of a true work of art. Such are the multitude and variety of these true and genuine productions, that often an uninterrupted current of rich and bright thoughts and glowing fancies regales the wayfarer through entire districts, who cannot but feel that a spirit of beauty hovers around these delightful scenes, and glides along these enchanting avenues with healing on its wings. The architects, out of a study of all styles, seem to have evolved the true principles of architecture for their guidance in design, and exchanged the pursuit of mere style for the pursuit of art itself, the shadow for the substance; and are consequently on the way to the restoring of the golden age of architecture, or the creation of one that may rival the Periclean. They are truly Australian works, because the architects have brought their own minds and feelings, imbued with the poetry and spirit and sentiment of their country and times, to bear upon their elements and their reconstruction.

There is no attempt here at utter originality in all details and features. All their buildings reflect the past as the source of their elemental design,—Greek, Mediæval, or what not. Their aim is not to make their buildings entirely dissimilar, unlike all former buildings, but to make them beautiful buildings, to vie in beauty and artistic quality with all the works of the past. Their anxiety is how they may impart to them all those qualities on which beauty depends,—unity, variety, breadth, power, harmony,—the qualities that alone entitle them to rank as works of art. In this they maintain that they are doing just what Greek or Mediævalists would have done under the same or the like circumstances, which circumstances they believe, and I think truly, are very different from those under which the ancient and Gothic architects entered on the elaboration, and creation, and refinement of their style, which from the imperfect germs, Pelasgic, Egyptian, and Assyrian germs, was necessarily more of a creation, a new style, than ours need or ought to be out of the perfect materials bequeathed to us.

MY DEAR,——,—Of the three great styles indicated in my last, the newest seems to me to be the Round-arched one; for this, when first taken up, was farthest of any from its perfected condition. Convinced that the Norman, compounded of two perfect elements, the column and round arch, and which owes its boldness and vigour to the inborn genius of the conquering race who reared it, still afforded great scope to architectural invention and taste, and was susceptible of the highest refinements, the Australian architects set themselves with enthusiasm to the task of working it out. They have taken it up at its best and most consistent phase, before it betrayed any tendency to develope itself into Pointed, and have carved it out agreeably with its own spirit; yet with all the purity that a taste chastened by Classic culture would dictate, and which had preserved the Romanesque ideal in their minds from everything barbarious and infantine, or that was tending or transitional to the future Pointed style. But this great Romanesque style is derived not from the Norman only, its elements are from all the Romanesques; Lombard, Rhenish, Byzantine, Provençal, Pisan, Italian, Romanesque,—all, whether domed or vaulted, have been laid under contribution. Everything good and consistent in each of these styles is preserved; and every hint for freedom of treatment taken advantage of. Out of all has been produced one noble and consistent Romanesque, with all the grandeur of the original Roman and all the richness and grace of Pointed Gothic; and to which genius, and immense resources in the past style have given an immense elemental variety. The variety of capital alone is enormous—some of these are from ancient German and Norman specimens, purified and corrected; but most of them are new designs in the same grand spirit as the old. They are chiefly foliated after the Corinthian type, and the bold abacus is generally richly moulded and carved.

I was delighted with the great churches—the creation of this style, with their massive unbuttressed walls, and bold square-sectioned arch; for they confirmed my own impressions of the Norman, Rhenish, and Lombard styles, which I always considered as all pointing to a style distinct from Gothic; capable of being purged from all impurity, and made as perfect a style in all decoration and detail as the Gothic itself, without losing its own characteristic qualities. They exhibit the ancient Round-arched style wedded to a refined and fitting system of decoration, and philosophically and consistently developed, with the full preservation of its native energy.

These churches are of various forms, as regards horizontal section,—round, octagonal, semi-octagonal, hexagonal, square, oblong, semi-circular. Some affect the Greek cross plan; others that of the Latin cross; but they are chiefly of the compact forms best suited to the reformed ritual, which, if not so significant of man's religious aspiration as the long-drawn aisle and lofty vault, are more fitting modern purposes, and are perhaps more symbolic of the great and noble simplicity of the Gospel, and to these forms the style seems very complacently to blend. I came, a few days ago, upon a most beautiful example of the Greek cross plan, in which the idea was beautifully worked out. The interior was crowned above by a noble hemispherical dome, springing from pendentives surrounded by four segmental ones, springing from a somewhat narrower base. On the exterior this arrangement is as fine as within. This is a favourite form, not because it is the Greek cross, but because it is geometrically a form favourable to artistic composition; for there is no set type of form here, either for cathedrals or the smaller churches. They use the cross as a symbol in decoration; but they think it ridiculous to mar their plans with it or deny themselves the variety that freedom would insure, by adhering to that type of form in their plans.

MY DEAR ——, —We had the good fortune of meeting the other day with the aged architect, the Earl of Sydney, who, I am told, has been most instrumental in introducing, or rather reviving, the great Romanesque style, and who is evidently a man of lofty and poetical mind. He entered delightedly into the subject of his views. "I could never," said he, "behold the illustrations of Caen, Winchester, or Ely Cathedrals, much less pace their venerable avenues, without feeling a yearning to divest the majestic pile of what offended the critical and cultured eye, and give to the expression of a noble idea all the faultless grace of language of which it was susceptible. I longed, in short," said he, warming with his subject, "to impart to their

* See pp. 327, 344, 373, and 456, *ante*, with letter from Mr. S. Huggins.

noble style of architecture those other graces and excellencies of which I felt it was susceptible, and which its great framers would have imparted had they been able."

I further gathered from the noble artist that he was the more wedded to the round-arched and vaulted style, from its being the chosen style of early Protestant communities,—the Albigenses and Waldenses of France and Spain, who repudiated Gothic, and clung to the Romanesque, the practice of which would have continued in the South of France but for the persecutions of those sects.

He has brought the style to the greatest perfection, I think, in his Church of St. John, situated in the collegiate quarter, close to the water's edge, and which I went to see yesterday. It is a domed and vaulted composition, the vault as well as the dome exhibiting itself externally, or rather having their external counterparts, for they are double, and have all the simplicity, repose, and grandeur of the ancient architecture.

With the utmost physiological vigour and greatness, it combines an intellectual grace and beauty, and approaches nearer to an ideal perfection than anything I have yet seen. The massive pillars of the nave are columns which have the graceful Classical entasis and diminution upwards. The arches are stilted and refined in their details. The windows are not the small, timid apertures of the ancient churches, but noble, fully-developed features, with bold shafts to the reveals, and filled in with tracery and stained glass. These, along with small arcades, here blank, there open, with the miniature column detached, and throwing a shadow on the wall, so enrich and beautify the façades that no want of intervening buttress is felt, and these are omitted generally.

It has no spire nor pinnacle of any kind, which the architect considers as belonging to the Pointed Gothic only. But, to break the skyline, some noble statues, of somewhat Herculean proportions, are placed over the angles and piers, and round the base of the dome, with an enlivening effect. These are of the highest class of art. The whole composition is, in short, the same bold masculine Norman idea encountered in Durham and Peterborough, in the most refined language in which it could be appropriately expressed. Broune, who has an intense love for the dome, was in raptures at seeing it happily wedded to, and forming an integral part of, this noble pile. Instead of adopting Venetian Gothic,—a name, by the bye, scarcely thought of here,—as Ruskin somewhere suggests as the groundwork of a national style, a wiser and more national course, I submit, would be to beautify our own by similar means, and enrich it with what other elements the sacred fire can fuse into it; and, as was the case in Venice, though influenced by other styles, and using freely various of their characteristics, we may yet avoid all incongruity. But this is a digression.

The highest possibilities of art can only be achieved by making every feature the most beautiful form it is capable of, with due harmony to the whole, and without regard to style or period; by emulating in the design of any given feature the finest example of that feature in any building, of any style, of any country; and by gathering hints in the works of the day from all that the past bequeaths and the distant unfolds. Important as this principle is, I believe it is less so than another which I see strictly respected here,—I mean that of bringing the influences of time, place, and occasion, material, and so forth, to bear upon our style. Styles, like human beings, must not only be the reflex of the creative energy that called them into existence, and of the organisation of the parent style or styles; but in their growth and development they must be the creatures of circumstances. If they be so considered, and laid bare to every circumstance and natural influence, the root is laid not only of originality, but of a new style. Let Gothic be pursued in this way, and we shall see the old style not merely revived, awakened from its ages of slumber, put on its legs, and set mechanically in motion,—it will be another Gothic style, growing organically out of the old, which old or parent style possesses, I believe, an inherent power for the development of the new and the beautiful in structural art, and only waits a due measure of creative power for its realisation. Buildings copied from thirteenth or fourteenth century architecture cannot be anything but dead, unoriginal, and false, as regards the present time; but architecture originating, taking its rise, merely, in the ancient Gothic, and in new hands truthfully adapted to new circumstances of new times and places, will be original—distinct from what went before and what ought to come after, and in harmony with itself.

SCAMOZZI SMITH.

TEMPERANCE HALLS.

WE mentioned in our last that the foundation-stone of the first building proposed to be erected by the London and Provincial Temperance Halls Company had been laid on a site between the Peabody-buildings and the Surrey Theatre. The building has a frontage upon the Blackfriars-road of 70 ft., and is designed in the Italian Pointed style, with facings of red brick and Portland stone, surmounted by a carved gable and inscription. The main entrance will be by two spacious enriched openings from flight of steps, giving ingress and egress to and from a vaulted vestibule. The great hall is approached by a stone staircase, and is arranged to hold 1,000 people. The shape, owing to peculiarity of site, is an oval founded on a hexagon, with a horse-shoe balcony and platform, and the ceiling will be coved and domed. The floors are to be constructed on fireproof principles, and ironwork where practicable is used throughout the building. The main hall will be lighted by a sunlight burner communicating with a large ventilating tube. The ground floor comprises two stone staircases, vestibule, and hall, main entrance corridor, Board-room and company's office, front and back restaurant, with lavatories, kitchens, &c., proposed to be fitted up on the same principles as the "People's Cafés." There is also a front shop, and a carriage entrance to the spare land in the rear, and private staircase to front hall. On the mezzanine floor there is a large room for suppers or meetings, dressing-rooms, committee-rooms for business purposes, lavatories, kitchen, offices, corridor, &c.

The works are being carried out by the contractor, Mr. Alfred Deards, of Blackfriars-road, at a cost of about 7,000*l*. Mr. John H. Swan is the architect.

BRICKS AND BRICK-DRYING.

WE have received some particulars of a brick-making process at works set up by Mr. Stephens at Kidwelly. Upon entering the works the first thing to be seen is a stone-crushing machine, into which the stones are cast and crushed to pebble size; from thence they are shovelled into a pan, over which two large rollers are worked, which grind the stone to powder. Both the pan and rollers are lined with chilled iron, and so are proof to damage by the hard silica stones from Mynydd-y-garreg. While the grinding process goes on a small white stream of a liquid compound falls into the pan which brings the powdered stone into the substance of mortar; then it is delivered to the moulder, who deposits the composition into a double-mould, places it into a press, which answers the purpose of pressing closely the bricks and of forcing them out of the mould. Then a lad carries them on a sheet of iron and places them in the oven for drying under the new process. This oven is constructed very much on the same principle as a baker's oven, only considerably larger, but in lieu of one floor there are several tiers constructed of upright and horizontal irons about 5 in. apart, upon which to lay the bricks, so that the oven can be filled from bottom to top, capable of storing about 10,000. When the oven is full, the iron doors are closed up air tight. Certain flues admit the hot air, and the bricks are said to be thoroughly dried in from three to four hours. Under the old process it would take twelve hours, with the consumption of two tons of coal and the labour of several persons over a large area of ground to dry 5,000 bricks; under the new system 10,000 bricks can be dried in three or four hours with 2 cwt. of coal, with less than half the manual labour, and without the extreme exhaustion caused to the workmen from being hours in the old dry-houses. The originator of the idea is Mr. P. Conniff, an experienced man in the trade.

Sale of a Tombstone by a Sexton.—Much indignation has been caused in South Kirkby by the discovery that a tombstone in the churchyard has been sold by the sexton. It was ascertained that the stone (which had cost over 20*l*. in erecting) had been "worked up" as a store table in a new house at Kirkby Flatts, belonging to the South Kirkby Colliery Company.

THE EXHIBITION AT SOUTHAMPTON.

SIR ALEXANDER COCKBURN opened the Exhibition of Works of Art at the Hartley Institution last week, and in the course of his address said, speaking of the Academy Exhibition,—I would recommend every one who has not seen this exhibition to make a journey to the metropolis on purpose, and all may rest assured their trouble in this way will be amply repaid. Every form of human life—enjoyment, feeling, emotion, and passion—is portrayed in vivid and glowing colours with a power and truth which do justice to nature; and the great merit of all these works is that whatever they portray, whatever form or phase of life they exhibit, they cannot fail to work upon our best feelings and to call forth all that is noble and good in the mind of man, and so not merely to gratify a passing sense and to create an intellectual pleasure, but also to promote the moral welfare of mankind. I confess that when I look at some of these productions of human power and art I am lost in speechless admiration at the power and capacity of man, who from the naked, bare canvas or from the cold and shapeless marble brings forth works that portray nature in all its beauty or exhibit man in every form of his existence. I rejoice that, besides the great advantages which this institution affords in the way of education and of intellectual culture, works of art will now invite the attention of the inhabitants of this town, and I rejoice also to see among some of those productions which we have visited with so much pleasure some most talented works by native artists of Southampton. I hope such exhibitions as the present will tend to develop and foster a taste for art, and be the means of encouraging native artists to compete, as I believe they can do, with those of the metropolis or the rest of the United Kingdom. I take a most deep interest in the welfare of the town of Southampton. The happiest portion of my public life was so closely associated with it that I cannot stand in the middle of this noble institution without congratulating you upon its existence. It affords the means of intellectual cultivation of the young, to whom education is of the utmost importance, and to those who are older it affords the opportunity of further improving themselves, and of that high intellectual enjoyment which results from literature and reading, and educational advantages for their children which they could not otherwise obtain. And believe me that of all the blessings, short of those which belong to another world, which man can possess in this, is the pleasure which arises from the possession of the intellectual treasures placed at his disposal. In conclusion, I beg to congratulate you on the opening of an exhibition from which I am sure you will derive the greatest possible pleasure and enjoyment.

Sir Henry Cole addressed the assembly, urging the popularisation of art-exhibitions by cheap admissions, and the establishment of rate-aided museums. He appealed to the Lord Chief Justice, as one of the trustees of the British Museum, to use his influence in endeavouring that the superfluous treasures in the cellars of that building should be made available for exhibition in local museums.

THE ARTISTS' RIFLE VOLUNTEER CORPS.

AMONG the numerous organisations which have emanated from the Architectural Association not the least successful are the architectural companies of the Artists' Rifle Volunteer Corps. They with the rest of the battalion were on Saturday last inspected on the parade-ground at the Horse Guards by his Serene Highness Prince Edward of Saxe Weimar, the general commanding the Home District. The commanding officer Major Leighton (Royal Academician) and the corps were, after the inspection, congratulated by the Prince on the manner in which the evolutions had been performed, and his remarks seemed fully to justify the universal feeling that both in numbers and efficiency the corps had far surpassed the standard of any previous period of its existence. The corps also took part in good force in the review at Panshanger (held in Earl Cowper's beautiful park) on Whit-Monday, a very considerable proportion of those present having left town on the previous Saturday and marched to Hertford under the command of Captain Edis, the acting major of the battalion, to whose initiative, it will be remembered, the formation of the Archi-

tectural Companies is due. It is, we think, creditable to the profession that it should be specially represented in the Volunteer force, and this patriotic movement ought to receive the hearty co-operation of those who are young, and at least the moral support of all. We understand that the Prize Meeting for rifle shooting will be held in June.

THE LATHE.

IN the opening lecture, given before the Manchester Society for the Promotion of Scientific Industry, Dr. Anderson, discoursing of Tools, said:—To select for an example the familiar tool called a lathe,—it is chiefly intended to impart to materials true circles, straight lines and flat surfaces, and all of these conditions must first exist in the tool. The bearing surface of the spindle neck must itself be absolutely round in the strictest sense, otherwise the article operated upon will not derive a true circle from the revolution of the spindle. The mathematically true circle here referred to is practically very difficult to attain. There are many tools in the world that are supposed to be round, but which are not so in reality. An examination of the Whitworth gauges will best convey the idea of what is meant by mechanical truth and a true circle, each part fitting accurately into the other, yet perfectly free in every position. Then again the lathe has to afford absolutely straight lines of movement for the guidance of the cutting instruments, whereby the true circle derived from the spindle and dead-centre point is developed into a true cylinder, but not so unless the parent circle and straight lines are correct in themselves. If a perfectly flat surface is required from the lathe, the cutting instrument must pass in a straight line transversely to the axis of the revolving spindle, and if the two are set absolutely at right angles to each other, a correctly flat surface is the result. If, however, any of the conditions of accuracy are wanting, then imperfection in the produce will follow, as a matter of course. If the lathe is intended to afford screws, it must first have a perfect screw within itself to copy from, for if there is any imperfection in the screw copy, or in the divisions of the teeth of the wheels by which it receives collateral motion, the screw produced will contain a transferred copy of each imperfection. It will thus be seen that the lathe is simply a tool to transfer its own character to other things; hence the paramount importance of having the lathe perfect in itself. But, unfortunately, the world, as a rule, does not sufficiently appreciate the difference between perfect tools and tools nearly perfect; but in the government of this portion of the world it is so arranged that those who do not are invariably punished, because the want of truth and accuracy entails greater cost in their production, both at the present time and hereafter.

WARMING AND VENTILATING.

WE have briefly alluded to the arrangements made and patented by Dr. Ancell Ball, of Spalding. As carried out under the patentee's own eye they seem to act so well that some further particulars may be found useful. He has a five-roomed cottage (of two sitting and three bed-rooms) so arranged, that in the partition-wall between the two lower rooms an aperture is left, with only one chimney, beneath which is placed in the said aperture a double-faced or Janus-grate, on each side of which is a hot-air chamber, provided with a water-evaporating pan, so that heated moist air, after being diffused into the sitting-rooms, can be conveyed through a hole in each brick up a *lofty* coachhouse into a hay-chamber above, where 140° are obtained. A higher temperature, we believe, can be commanded, for the thermometer would only show the above amount. The same kind of air can be conveyed into a lobby in each lower room, or a passage or hall, where it is admitted through openings, which can be plugged with a stopper at night before bed-time, when the warm air can be conducted up to the three cottage bedrooms, which will be comfortably warmed before bed time. We now come to the description of the little double-faced Janus-grate for a cottage, it has two very *different-looking* faces, the one for the sitting-room, looking like an ordinary, cheerful fireside, with the front flush with the wall, which does not project into the room; whilst the *kitchen-side face* presents a complete *range*, with three holes in the hot-plate for a large pot with tap, as a substitute for boiler,—one for a frying-pan, and a central one for a kettle, &c., which can, by means of a little door above the grate, be conveyed from one room to the other,—a very useful and ingenious contrivance. Beneath the grate a large oven is placed, and the flame is conveyed round three sides of it, at the same time imparting heat to the two hot-air chambers, so that the maximum of heat is abstracted before the little smoke that remains passes into the chimney. This is not all, for the *two* faces abstract so much air that cheap coke is readily consumed in the upper two-thirds of the grate, whilst a grated drawer slides in beneath to consume the best riddled small yet cheaper coals, called "*Nuts*," the *smoke* from which ascends through the incandescent coke, where it is *consumed*, at the same time emitting light and additional heat. The hot ashes are frequently falling upon the *top* of the oven, which is thus well heated through four of its surfaces.

As to ventilation, the doctor's first step is to admit the outer cold winter and pure air into the two lobbies of the cottage, first by conducting it to the ceiling through finely-perforated zinc and muslin, which not only excludes an excess of air, but also divides the cold current so finely that it becomes rapidly heated by the hot, moist air which it meets in the lobbies, so that when a person opens the inner lobby-door, to enter the sitting-room, no current of cold air or disagreeable draught is experienced by those sitting there. This plan is only adopted in the cold weather; for in the summer-time the windows above the outer doors work on pivots, in order that a full current of air can be commanded in the hotter months.

Having thus admitted the outer pure air after first warming it, the next important thing to be done is to carry off, as fast as it is generated, the impure air in the room proceeding from the breath, from gas, lamps, perspiration, &c.; and this is accomplished through a cheap flue, formed by an opening in each brick, and placed one above another, from a part near to the ceiling to a certain distance up the breast of the chimney, having no communication, however, with the smoke-flue, although warmed by it; for the said ventilating-flue is formed in and through the brickwork in the breastwork itself, and in order to prove its successful action a feather is suspended over the entrance, where it is powerfully drawn by the upward current into the chimney.

CREMATION OR BURIAL.

SIR,—When a question is being freely discussed there is nothing to be done but to reiterate the old arguments on either side till these are put in the tersest of forms. The argument in favour of cremation will, in this letter, I am inclined to believe, be found more cogent than those which I previously addressed to you, and which appeared in the *Builder*.*

I must confess that, although a "Cremationist," I have myself made designs for carrying out Mr. Seymour Haden's mode of burial, which have been approved by experienced undertakers. I did this in the hope that the adoption of Mr. Haden's plan for a brief space of time would have the effect of breaking through old forms and prejudices, and that it would therefore serve as a step towards the right thing. Nevertheless, I consider Mr. Haden's argument for "earth to earth," as against cremation, utterly untenable. It appears to me to be based upon erroneous assumption, and to exhibit a total forgetfulness of the great principle in nature by which all decomposition is effected, viz., by fire. The entire solar system is worked by cremation. Without cremation, *i. e.* solar heat, all animation, all change, all decomposition would be at an end.

One of Mr. Haden's *dicta* is, that "nature never errs." How was it, then, that nature did not implant the instinct to bury in the animal creation in the generations of animal life which preceded man on the earth? The huge carcass of the mastodon, as well as the bodies of lesser creatures, rotted on the surface of this planet, and this was Nature's system through eons of time. Again, how will the assumption that "earth to earth" is the *natural system* hold in reference to the mammalia of the deep, the largest mammals of this globe? Moreover, I believe it could be demonstrated that this surface exposure of animal remains to decomposition, to the action of wind, rain, and sun, is even preferable to burial in any form, as decomposition, *i. e.* cremation, thus effected, is more speedy, and the resolved elements are sooner spread broadcast, for reappropriation, reassimilation, by the living. The fact is that every one rightly tutored in physical science will know that the decomposition of human remains, in whatever way effected, is only either a quicker or slower process of combustion, *i. e.* cremation. The question therefore resolves itself into the simple one, of which, in the interests of the living and commonweal of nature, is the better mode of the two, the rapid or leisurely system of consuming them.

Animate beings are even during life cremated, over and over again. It used to be supposed once in seven years, but Mr. Haden now tells us that it occurs much oftener and that the whole *matériel* of a human being is consumed and given off every six weeks. So that the *rapid* decomposition of animal life on the surface of the globe is, after all, not noxious. But if this natural rate of combination be impeded and lowered, communities are immediately afflicted with infectious diseases.

If in burial the earth enters into chemical combination with the decomposed elements of animal matter, these are locked up from use for an indefinite period and we wrong living things. On the other hand, if this intimate union between the earth and the decomposed elements does not take place, and these elements are only held suspended in it, we may be sure that they will escape, and that the very slow process of combustion, necessitated by burial, will be prejudicial to the living.

Seeing, then, that nature effects all decomposition by cremation, and that slow and impeded decomposition, combustion, is alone hurtful, cremation is evidently the mode of resolving the dead body indicated by nature and that most conducive to the health of the living.

W. C. T.

* See p. 34, *ante*; also vol. xxxii., pp. 337, 771, 951.

THE LIGHTING OF LONDON.

SIR,—There are many ways in which they still do things better in France and elsewhere than we choose to do them in England, and one of these is the artistic way in which they light their streets and large open spaces. The lamps are so disposed as not only to give a pleasing effect when they are lighted, but their arrangement is seen in the day-time to conform to some plan. They are an ornament by day as well as by night. Is there one spot in London where this can be said of our public lamps? This, of course, is partly because nothing is done in London under one authority or on one system. But a chief cause of this is attributable to mere stupidity and a want of taste on the part of those into whose hands the business of placing the lamps has fallen. Out of many examples that might be selected let us take the Thames Embankment, the most important thoroughfare lately completed, and one about which we are a little boastful. There is nothing to be said against the handsome lamps on the parapet. They are an ornament by day as well as by night. But it was necessary to have additional lamps to light the broad roadway. There are several ways in which they might have been arranged to correspond with the lamps on the parapet. A lamp in every interval, on the opposite side of the roadway, would have given ample light, and probably have produced the best effect from every point of view. But the person employed did here just what he would do in any other street. He commenced at one end of the embankment and placed the lamps on each side at the regulation interval. It was nothing to him that one of his lamps should thus repeatedly stand close under one on the parapet, and that many intervals should in consequence be without any lamp. He merely did the thing in the stupid, regulation way with which our Boards and Vestries are contented. There can be no doubt that some rule on this subject—that there should be a certain number of lights along a given distance—is very necessary, but no rule necessitates blundering. Another exception to the rule should be that, where one street intersects another, there should be a lamp at the four corners. These are points where light is most required. The intervening lamps would be spaced accordingly. What would it matter, if, along a broad safe pavement, the lamps were a little unequally spaced? Then about the larger open spaces, and in the centres of crossings, there should be double or clustered lamps, with some pretensions to adorn the places where

they stand. Where this has hitherto been attempted stupidity has of course done its best to mar the effect. Look at the combination, without any thought of arrangement, of the ordinary street-lamps, at their regulation intervals, with the ornamental clusters of lamps about the Houses of Parliament. It is a scene of confusion both by day and by night. How unlike a *Place* in Paris! The same cause is seen to defeat the attempt to give a little dignity to the new space in front of St. Paul's. Could not the chapter and the vestry agree to act together in this matter, or was there not taste enough on the part of either body to lead them to think about it? It is perhaps not too much to hope that before long the lighting of London may share in the improvement of the City in other respects. Soon there will be the necessity, when the new street from Charing-cross is opened out to the Embankment, and the promised improvements are made in Trafalgar-square, to think about the lighting of "the finest site in Europe." It is scarcely an exaggeration to say that at present it is not lighted. Let us hope that here at last a good example may be set. A. P.

THE INSTITUTION OF SURVEYORS.

THE annual meeting of the members of this Institution was held last Monday, at their hall in Great George-street, Westminster, Mr. Thomas Huskinson, presiding.

The report, which recorded the proceedings of the seventh year of the Society's existence, congratulated the members on the progress and prosperity of the Institution during that period. The number of members of all classes who had, during the past year joined the Society, was 52, being 1 honorary member, 31 ordinary members, 16 associates, and 4 students, making the present number as follows:—Honorary members, 6; ordinary members, 269; associates, 101; and students, 10; or a total of 386. Four debentures bonds of 25*l.* each from an anonymous donor; an elaborate and massive carved presidential chair from Mr. T. T. Wing; and the payment of the cost of improvements at the entrance to the hall by Mr. Driver, were among the gifts acknowledged by the Council. The total subscriptions from members and associates during the past year amounted to 895*l.* 13s., which was a large increase upon those of former years. The report was adopted.

Thanks having been passed to the various officers of this Society, the following were the gentlemen elected as the Council for the ensuing year:—Mr. Thomas Huskinson (president); Messrs. J. Mathews, J. Oakley, E. J. Smith, and W. Sturge (vice-presidents); Messrs. W. J. Beadel, V. Buckland, H. Crawter, R. C. Driver, E. Ryde, C. J. Shoppee, F. Vigers, T. C. Clarke, C. Stephenson, E. P. Squarey, D. Watney, and T. S. Woolley (ordinary members); and Messrs. J. H. Lloyd and R. B. Grantham (associates).

The president then received the thanks of the meeting for presiding.

MONUMENTAL.

MR. FORSTER, M.P., unveiled at Bradford, recently, a statue of Mr. S. C. Lister, whose enterprise and inventive genius have been the means of materially adding to the prosperity of the town. The right hon. gentleman expressed a hope that, in after days, the statue of Mr. Lister would be admired, not merely because it gave the form and features of a rich and successful man, but because it presented the form and features of one who was endowed with industry, with intellect, with energy, with courage, with perseverance, and who spared himself no pains in first ascertaining the conditions of the problems he had to solve. His heart never fainted, his will never relaxed, in determining to carry out those conditions.

The statue, which is of white Sicilian marble, and 10 ft. high, represents Mr. Lister standing erect with a 2-ft. rule in his right hand, his left resting on a scroll of paper on a pedestal, which bears four bas reliefs, setting forth the progress made in weaving. The monument stands at the junction of two paths, just within the principal entrance of Manningham-park. It is from the studio of Mr. Noble, of London.

Bristol.—A considerable dispute is growing up between the masters and labourers: the latter suggest arbitration.

CHURCH BUILDING NEWS.

Crofton (near Wakefield).—The parish church has been re-opened after restoration. As it now stands, it is built in the form of a Latin cross, consisting of a nave, 50 ft. long and 20 ft. wide, without aisles; a north and south transept, each 13 ft. wide and 19 ft. in length; and a chancel, 30 ft. long and 16 ft. wide. The north doorway is now closed by masonry, the original oak door being still preserved in its place. At the intersection of the nave and transepts is a tower, 19 ft. square, and about 52 ft. in height, containing a clock and three bells. The piers, or responds, of the tower arch are brought forward 5 ft. on each side into the nave. The repairs just completed include new roofs to the nave, chancel, and transepts; new stalls throughout, with pulpit and prayer-desk, and a traceried screen separating the vestry from the south transept; new doors to the nave and chancel; a crypt under the vestry, with a hot-water apparatus; new mullions to the windows, and repairs to the window-jambs and other parts of the building; the old floor of the tower has been replaced by a new one with an oak ceiling, instead of the former lath and plaster; all the interior has been cleared of plaster, and the stonework restored. The whole of the woodwork has been executed in oak, in style to match the original structure. The new roofs have been formed with arched ribs concentric with the tower arches, carried by moulded stone corbels, enriched with carving in the chancel, and boarded. The chancel has been laid with Messrs. Minton, Hollins, & Co.'s tiles. The work has been carried out by Messrs. Leake & Denison, builders, of Normanton; the hot-water apparatus by Messrs. J. Bevitt & Son, of Pontefract; and the glazing by Mr. Cuthbert, of Wakefield.

Farley.—This church, built by Sir Stephen Fox in 1688, was rededicated on Easter Tuesday, after restoration. No attempt has been made by the architect to alter the essential features of the church. The seats, of grained oak, have been cut down, their doors removed, and their dimensions and direction made uniform. A new oak screen has been placed under the south arch, the pulpit has been cut down, relieved from the heavy sounding-board, and placed on a base consisting of a stone plinth, and pierced panels of the old oak, outside the chancel screen. The chancel has been raised, and on either side are a prayer-desk and two rows of choir-stalls. These show a combination of old and new materials: the fronts of the prayer-desk are formed from the door and a superfluous panel of the pulpit; the fronts and backs of the stalls are made by an admixture of the dark panels from the old pew doors, with new stiles and rails. The whole of the east wall is occupied by a reredos designed to accord with the Classic architecture of the church, and formed of Caen stone, with panels of Devonshire marble separated by alabaster pilasters at the sides, and a centre with inlaid marble, and panels of Venetian mosaic, executed by Signor Salviati, from the designs of Mr. W. F. Dixon, London, under whose direction the decoration of the walls was effected, and by whom the east window was executed. This window represents the Crucifixion, and contains five figures of large size. The rest of the windows were supplied by Mr. Powell. The standards and other lighting apparatus in the chancel are from the manufactory of Messrs. Hardman. The architect was Mr. Currie Christian.

Northampton.—The Parish Church of Old (or Wold, as it is sometimes called) has been re-opened after restoration and repair. The restoration has included the entire re-roofing of the edifice. The organ-chamber and the south side of the chancel are new, as are also the vestry on the north side of the chancel, and the arcade on either side of the same. The east end of the church has been raised and restored, and a partially new window put in. The old fittings have been removed; the original floor-level restored to the nave and south aisle; and the chancel floor raised three steps above the nave and aisle. The new chancel floor is laid with Maw's encaustic tiles, as are likewise the steps leading up to the altar, &c. The whole of the plaster has been removed from the masonry and walls of the interior, and the windows and arcades restored. The windows, with the exception of the west window, have been re-glazed. An almost entirely new ceiling has been put into the tower, from which the old gallery has been removed. The choir fittings and the screens are new, and, like the new roof, are of pitch-pine. The walls within the sacrarium, to the height of the reredos, are lined with smooth Bath stone. On the outside the ground for two yards round the walls has been lowered half a yard, forming a pathway all round the building. There has been an external restoration of the plinths, coigns, and buttresses, but only partial. The cost has been about 1,950*l.* The architect is Mr. C. J. Bather, of Shrewsbury; Mr. R. Cornish, of North Walsham, did the masonry; Mr. Pilgrim, of the same place, acting as clerk of the works. The glazing was done by Mr. Dove, of Shrewsbury.

Stonesby (Leicestershire).—The parish church was re-opened on the 12th ult., after having been under restoration for more than twelve months. The works comprise new roof to the nave, extensive window restorations, removal of plastering and pointing walls, and repair of wrought stonework generally, and drainage outside building. The interior is fitted up with new deal benches, and a portion of old benches; new pulpit of oak, with stone base; new reading-desks, heating apparatus, tower screen, &c. The south porch has had stone-work restored and a new pair of oak gates. The works have been carried out by Mr. G. Chester, builder, of Waltham, from the designs and under the superintendence of Mr. R. W. Johnson, architect, of Melton Mowbray. The work has been done by voluntary contributions, the Duke of Rutland being the principal subscriber to the work.

Islington.—The new church recently erected in Prebend-square, Popham-road, Islington, at the cost of the Clothworkers' Company, in lieu of Lamb's Chapel, Monkwell-street, City, which has been pulled down to make room for City improvements, has been consecrated by the Bishop of London. The church, which is dedicated to St. James, adjoins the almshouses in the Popham-road, and is in the Gothic style of architecture, from designs by Mr. F. W. Porter, the builders being Messrs. Dove, Brothers, and has been erected at a cost of 8,400*l.* There is sitting accommodation for 500 persons, the whole of the seats to be free and unappropriated, with the exception of fifty, which are reserved for the members of the Court of Clothworkers. The tower contains a clock and a peal of six bells.

Hastings.—On the 13th ult., the new Christ Church, in London-road, was opened for divine service. Its dimensions are,—total length, 150 ft.; total width, 92 ft.; height from floor to ceiling, 59 ft. The architect is Mr. Arthur W. Blomfield; Messrs. Dove, Brothers, being entrusted with the carrying out of the plans.

Burghclere.—The parish church, commonly called "the New Church," was built in 1838. This church, now the Church of the Ascension, built of squared flint, with west tower, transepts, and small apse, in the debased Perpendicular style, possessed no architectural features, but has since been remodelled, and was on the 16th ult. (Ascension Day) re-consecrated. The west and north galleries have disappeared. A light glazed screen admits to the church through the west tower, while the ringing-loft above is concealed from view by carved panel or dark pine, relieved with red. The open seats are of yellow deal, stained and varnished. The east wall has been taken down, and a chancel, approached by three steps and divided from the nave by a low stone wall and arch, has taken the place of the former apse. The chancel, as well as the sanctuary, which is raised another three steps, is paved with Maw's encaustic tiles, the nave being paved with a hard grey tile of local manufacture. The five-light east window is of stone tracery in the Late Perpendicular style, as are the two windows on the north, and the one on the south of the chancel. The roof is ribbed and panelled in pitch pine varnished, the choir-seats being in oak. On the north of the chancel is an arched doorway leading into a vestry, and on the south an arch opens into the chancel aisle. The old east window (which is a memorial to the late Rev. W. B. Barter) has been placed in the east end of the north transept. The restoration has been carried out by Mr. W. G. Adey, of Newbury, under the direction of Mr. R. Norman Shaw, of London, architect.

Hook (Dorset).—The church of this parish has been re-opened after restoration. The tower, roof, windows, and chancel-arch are new, the outer walls made sound, and the unsightly old belfry and gallery have been removed. We are informed the entire cost of this renovation has been defrayed by the Countess of Sandwich. The architect is Mr. G. R. Crickmay, of Weymouth, and the work has been executed under the superintendence of Mr. Rowe, the Earl of Sandwich's agent at Hook.

OLD LONDON.

In the course of some extensive building operations now in progress at the well-known works of Messrs. Tylor & Sons, No. 2, Newgate-street, a small portion of the wall with which the Romans surrounded the London of their days has been brought to light, and, with the good spirit which is characteristic of the firm in question, a small area has been formed by brick walls in front of it, so that it may be retained as a historic landmark. The London level at the time of the Great Fire (of which some relics have also been found) appears here to have been about 12 ft. below the present level, and the portion of wall found is all below the old level. The foundation is of small pieces of rubble concreted, over which run four courses of tiles, or large thin bricks; upon which is ragstone masonry to the height of 2 ft. 6 in. Then come two more courses of the tiles, and above them more masonry. Even if this be not actually Roman work, which we are not prepared to assert (our examination having been cursory), but the result of Norman rebuilding, the Roman model was closely followed. Looking on this wall, we see through seventeen centuries and more, for the Romans when walling the *Colonia* kept to the line of the Celtic hill fortress which existed long before their advent.

SANITARY STATE OF DUBLIN.

While the Corporation this present week are disputing their responsibility in the law-courts as to the cleansing of the Liffey with the Port and Dock Board, the streets of Dublin are in a worse condition than ever as regards filth and obstructions. It is simply disgraceful that the municipal body should be so oblivious to their duties. What with the abominable odour arising from the bed of the Liffey, which is nothing more than a foul elongated open sewer, and the accumulations of unspeakable nastiness to be observed in many quarters of the city north and south, Dublin is ready at any moment for the ravage of a frightful epidemic. During the last few days we have witnessed some deplorable sights, plainly and undeniably traceable to Corporate neglect. Dirt and filth in courts, alleys, and lanes, dirt in back streets, and leading thoroughfares; several feet deep of dirt and stagnating filth in the bed of the Liffey, and no less offensive dirt on either side of it; on quays and crossways, under the very walls of the now nearly "restored" Christ Church Cathedral. We observed heaps upon heaps of all sorts of rubbish and nuisance upon the streets, and these heaps were allowed to lie undisturbed not for a few hours, but two or three days, unremoved. At the present hour several of the leading thoroughfares are out of repair and broken up into ruts, on a fine day enveloped in clouds of blinding dust, and on rainy days studded with pools of water or miry slush. The public money is being wasted right and left in law-suits, religion and politics are uppermost in the Council Chambers, and sanitary reform is relegated to misty faturity.

CONVERSAZIONE AT THE INDIA MUSEUM.

Mr. Harrison, as President of the Institution of Civil Engineers, and Mrs. Harrison, held a *conversasione* in the galleries at South Kensington, now occupied by the collections of the India Museum. The Horticultural Society lent plants, the band of the Royal Engineers discoursed music, and for some hours Mr. and Mrs. Harrison, assisted by Mr. James Forrest (the secretary), and a few members of the council, received and welcomed a continuous stream of visitors. In the first room entered after ascending the staircase are found Dr. Leitner's Takht-i-Bhai Sculptures, of the highest interest and value, illustrating the blended influence of Budhism and Hindooism, and, it would seem, of Greece, through Bactria; also the Ethnological Collections made by Dr. Leitner, in Dardestan, and by Shaw and Forsyth, in Kashgar and Yarkand. The walls are hung with copies by Major Gill, R.E., and Mr. Griffiths, of the celebrated paintings of the rock-cut temples of Ellora and Ajunta; and with a series of photographs, arranged by Mr. James Fergusson, which represent the ancient architecture of India. The centre of the room is occupied by four cases and a pagoda of idols, forming a Hindoo Pantheon. In Room XIX., besides the continuation of the "Yarkand Museum," one entire side is covered by a collection of Indian and Oriental arms. In Room XVIII., the choicest manufactures of India have been brought together—silver, gold, jewellery, enamels, brass and copper, carvings in ivory and sandal-wood, *Bederi* and *Koftkari*, pottery, *papier mâché*, Delhi miniatures, and native paintings. In Rooms XVII. and XVI. the ordinary manufactures of the country are exhibited, amongst which its textiles occupy a large space. The collection is especially rich in artistic muslins, nets, and embroideries, *Kinkobs*, silks, Cashmir shawls, and carpets. We shall give a fuller account of the Museum in our next. The *conversazione* was entirely successful.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

Sir,—In your account of the ordinary general meeting held at this Institute on Monday last, I am reported to have said, when the question of adjournment was under consideration, "that the 7th of June was open."

This is a mistake, but an excusable one. The 7th of June had been fixed and announced for the reading of Mr. R. P. Pullan's paper "On the Decoration of Basilicas and Byzantine Churches," and it would have been ungracious indeed to its author if this fact had been ignored. The truth is, that only one more meeting-night remained in the present session; and, as a general wish was expressed to adjourn the discussion on Mr. Smith's paper, there seemed no choice but to postpone the reading of Mr. Pullan's paper until next session.

To this arrangement, which was made with great reluctance on the part of our President, Mr. Pullan has since most courteously consented; but, in justice to him, it is only right that the circumstances under which his paper was withdrawn should be accurately recorded.

Charles L. Eastlake, Sec.

Books Received.

Renaissance in Italy: the Age of the Despots. By John Addington Symonds. London: Smith, Elder, & Co.

This volume forms the first instalment of what is intended to be an exhaustive treatise on the period of the Renaissance in Italy; the second part of which will be devoted to the fine arts and the revival of learning; and the third part to Italian literature. It will, of course, be in the promised second part that the chief interest of readers of this journal would centre; and we shall defer any notice in detail till this second part reaches us. Meanwhile, we may say that the work of Mr. Symonds seems likely to form an important contribution to the literature arising out of that revived interest in the Renaissance in Italy, of which we have seen not a few indications lately; and that the author supports the view which has already been put forth by critical writers on this period of history, that the spirit of rebellion against monasticism, and the desire of intellectual freedom, which mainly gave rise to the Renaissance, had been stirring in the social and literary mind of the nation for a considerable time before the period from which its open and acknowledged development is generally dated. "It must not be imagined," he observes in his introductory chapter, "that the Renaissance burst suddenly upon the world without premonitory symptoms. Far from that, within the Middle age itself, over and over again, the reason strove to break loose from its fetters." The volume deals with the relation of the political and social life of Italy to the great change of thought, as the headings of some of the chapters will sufficiently indicate,—"The Republics," "The Popes of the Renaissance," &c.; and two entire chapters are devoted to Machiavelli and Savonarola respectively. The author, in his remarks on the spectacle of unbridled and exaggerated cruelty and licentiousness which this age in Italy presents, is probably correct in his opinion that this fearful pre-eminence of unusual crime was due in some measure to the high-wrought fantasy of the Italians, which could not be contented with ordinary or common revenges or indulgences, but sought to exalt cruelty into an art. "This is why so many acts of violence in Italy assumed fantastic forms"; and this, we may add, is possibly, in a measure, the key to what has puzzled many who would wish to claim for art a purifying influence; the fact, namely, that the age of the highest art since Greece was also the age of the greatest immorality. The pre-eminence in each case is to be traced, in the end, to the same over-wrought mental and intellectual activity and excitement.

As a specimen of Mr. Symonds's style and tone in dealing with his subject we may extract the following description of "the men of the new age."

"Europe was, as it were, a fallow field, beneath which lay buried the civilisation of the old world. Behind stretched the centuries of Mediævalism, intellectually barren and inert. Of the future there were as yet but faint foreshadowings. Meanwhile, the force of the nations who were destined to achieve the coming transformation was unexhausted; their physical and mental faculties were unimpaired. No ages of enervating luxury, of intellectual endeavours, of life artificially preserved or ingeniously prolonged, had sapped the fibre of the men who were about to inaugurate the modern world. Severely nurtured, unused to delicate living, these giants of the Renaissance were like boys in their capacity for endurance, their inordinate appetite for enjoyment. . . . Their fresh and unperverted senses rendered them keenly alive to what was beautiful and natural. They yearned for magnificence and instinctively comprehended splendour. At the same time the period of satiety was still far off. Everything seemed possible to their young energy; nor had a single pleasure palled on their appetite. Born, as it were, at the moment when desires and faculties are evenly balanced, when the perceptions are not blunted nor the senses cloyed, opening their eyes for the first time on a world of wonder, these men of the Renaissance enjoyed what we may term the first transcendent springtide of the modern world. Nothing is more remarkable than the fulness of the life that throbbed in them. Natures rich in all capacities and endowed with every kind of sensibility were frequent. Nor was there any limit to the play of personality in action. We may apply to them what Mr. Browning has written of Sordello's temperament:—

> 'A footfall there
> Suffices to upturn to the warm air
> Half-germinating spices; mere decay
> Produces richer life, and day by day
> New pollen on the lily-petal grows,
> And still more labyrinthine buds the rose.'"

Miscellanea.

An Engineering Difficulty.—In the construction of the extension of the Great Western Railway from Netherton to Old Hill and Hales Owen, an engineering difficulty of a novel kind has been met with. At a point about three-quarters of a mile from Hales Owen, the line has to pass through a deep cutting along the side of a hill. The excavation has been made for some time, and shortly after its completion it was noticed that the face of the cutting on the side nearest the summit of the hill was gradually settling or sliding down towards the line. Accordingly men were set to work, and the cutting was enlarged. Again, however, the ground sank, and it has done this so repeatedly that although the width of the cutting has been extended for a considerable distance beyond the boundary of the railway, the line cannot be pronounced safe. The ground has been found to consist of layers of clay, so unstable that it is considered no breadth of cutting would ever render the line safe, as the summit of the hill almost would have to be removed before the downward movement could be arrested. At present two plans are under consideration. One is to face the sides of the cutting with a massive wall, which will be further supported by heavy cross girders of iron. Another plan is to tunnel through the hill, in which case extensive colliery rights will have to be purchased. The completion of the line is thus prevented.

Lord Aberdare and the Strike.—Lord Aberdare has written a letter to the Cardiff papers, showing the losses which the men in Wales have sustained through the present strike. He takes the figures given by the men themselves, which, allowing for deductions of colliers at work, gave 50,000 men out of employment. They have now been out, he says, after deducting holidays and Sundays, 122 days, and allowing the men to earn 5s. a day, that makes 1,300,000*l.*, while the 12,000*l.* sent by the Miners' Association only give one day's wages for men on strike. Add to this number 60,000 men locked out, and their wages would make a total of 3,000,000*l.* lost by the workmen alone. The loss to capital, he says, is incalculable. He adds that this only represents a portion of the suffering caused by the strike, as a large number of other employers of labour have had to dismiss workmen entirely unconnected with collieries.

The Drainage of Towns on the Thames. A Local Government Board inquiry was held on the 26th ult., at Abingdon, before Mr. J. Thornhill Harrison, C.E., one of the inspectors of the Board, in answer to an application from the corporation of Abingdon, for powers to purchase land compulsorily for a sewage farm. It is intended at Abingdon to carry out a scheme of Mr. J. Bailey Denton's for the disposal of the sewage by intermittent downward filtration, combined with irrigation. Mr. S. W. Leach, engineer to the Thames Conservancy Board, was one of the witnesses, and was asked by Mr. Harrison to tell him what had been done by the various towns on the Thames towards diverting the sewage from the river. Mr. Leach said that a vast number of notices had been served upon local authorities and upon individuals requiring them to discontinue discharging sewage into the Thames, and in looking over that list it was astonishing to see the number of cases in which the requirements of the Conservators had been met, though in some cases only temporarily, by stopping the drains and running the sewage into cesspools, a system which the inspector described as dangerous to the water supply of towns which had adopted the system, Staines being one that had come under his notice. Mr. Leach stated that this process had been adopted at Wallingford, Henley, Marlow, Egham, and Staines. Mr. Leach said he had observed beneficial results from the diversion of the sewage in the condition of the water.

Accident at the Leeds Corporation Pumping Works.—Early on the 26th ult. a serious accident occurred at the Arthington Pumping Station of the Leeds Corporation Waterworks. By the breakage of a portion of the machinery the pumping power of the works has been reduced one-half, rendering it probable that the supply of water to the borough will have to be materially curtailed. Early in the morning, the two men in charge of the machinery were alarmed by what seemed an explosion. An examination of the pumping apparatus revealed the fact that the clack-box of the pump, a strong iron cylinder about 30 in. in diameter, had burst. In addition to this the 30-in. pipe connecting the clack-box with the valve had been smashed and rendered useless, and the valve itself injured. At a special meeting of the Waterworks Committee, Mr. Filiter, C.E., the Waterworks engineer, reported the extent of the injuries done. It would, he said, take four or five weeks to repair the injuries, and as their present supply of water would not last more than a month, it was desirable that the greatest care should be exercised by consumers. The committee resolved that the water should be turned off every evening at six o'clock, until six the next morning, so as to prevent any waste that might take place during the night.

Removal of Bars and Gates.—At the usual weekly meeting of the Marylebone Vestry, last week, a communication from the Vestry of St. George's, Hanover-square, was read, stating that, in answer to a letter from that Board relative to the opening of the gates at Harewood-place, Oxford-street, the Vestry of that parish had come to the following resolution,—"That this Vestry do join the Vestry of St. Marylebone in suggesting to the Earl of Harewood that directions should be given for the opening of the gate at Harewood-place daily for a few hours in the afternoon, as requested by the Marylebone parish." It was further suggested that the application should be for light traffic only. The vestry clerk then read a letter from the Earl of Harewood, stating that he declined to comply with the application. Mr. Poland thought it high time that the Vestry, with the co-operation of other vestries, should take the matter up, and have these abominable nuisances of gates and bars removed from the metropolis. He moved that the matter be referred to a committee, and this was ultimately resolved on. We quite agree with Mr. Poland.

Toughened Glass Exhibited.—The toughened glass of M. de la Bastie has just made its first appearance in a public exhibition at the agricultural show of Avignon (Vaucluse). The visitors pressed around the rail, which was insufficient to protect the specimens from the experiments each person wished to make on his own account; neither knocks with stones, blows with walkingsticks, nor even digs with bootheels being spared. Consequently, no decision of the jury was received with greater approval than that which awarded to the inventor a gold medal and a diploma of honour.

Demolition of a Factory Chimney at Stalybridge.—At a large building at Stalybridge, known as Johnson's Mill, and immediately adjoining the railway station, which had been in course of demolition for several weeks, the material had been purchased and removed by various contractors, with the exception of a large brick chimney, which had been purchased by Mr. Samuel Cook, of Mottram-road. This chimney was 65 ft. in circumference at the base, and 145 ft. high; and in order to accomplish its speedy demolition, a deep trench was formed underneath, and four courses of brickwork removed; twenty-nine large blocks of wood were then placed in the aperture, and covered with a quantity of coal, and the pile was lighted at noon. The fire burned steadily for twenty-five minutes, when the apex of the chimney was observed to lean slightly, and the whole pile came to the ground immediately afterwards with a loud crash. The building was erected some forty years since, and has been purchased for a contemplated extension of the Manchester, Sheffield, and Lincolnshire Railway Company's premises.

Joint Water Supply for Manchester and Liverpool.—A second report on the proposed new water supply for Liverpool has just been drawn up by Mr. J. F. Bateman, C.E., and laid before the Water Committee. The Bleasdale and Wyredale schemes which have been proposed, Mr. Bateman estimates would produce about 24 million gallons of water a day, and that the cost would be 2,871,047*l.* This, as compared with the Ullswater scheme, which is proposed to be worked in conjunction with Manchester, shows a greater expenditure, the Ullswater scheme giving a supply of 20 million gallons *per diem*, and costing 2,420,703*l.* Mr. Bateman is in favour of the Ullswater scheme, as providing for a longer period, and objects very strongly to a proposal to open twenty additional pumping-stations in the Liverpool district, as they would cost 1,800,000*l.*, and the water would be hard, and sometimes impure.

The Use of Sewage Water in Factories. In an inquest held at Rochdale on the body of John Keyton Hardiker, engineer, employed at the foundry of Mr. Davenport, the evidence went to show that the health of the deceased had been seriously affected by the effluvium of the water used for the condenser of the engine, which water was taken from the sewers. The jury gave as a verdict that Hardiker had died from cerebral hemorrhage, and that his death had been accelerated by working in an atmosphere where sewage water was used for condensing purposes; and they recommended the Health Committee of the Town Council to put a stop to the use of sewage water for condensing purposes.

Children Playing with Matches again.—On the 27th ult. a disaster, resulting in the destruction of property valued at from 8,000*l.* to 10,000*l.*, happened at Ickham, a village distant about six miles from Canterbury. Two children, while playing with matches, set fire to a stack at the rear of the Court Farm, occupied by Mrs. Henry Collard. The flames communicated to other stacks and outbuildings, all of which were destroyed. Favoured by the wind, the conflagration next extended to some farm buildings on the opposite side of the road. These were quickly burned to the ground, as were a builder's workshops and the contents of the yard. A public-house and twelve cottages were gutted, as was also a hop oast, which contained about sixty quarters of wheat and other valuable produce, together with many agricultural implements.

New Church at Stanley.—The foundation-stone of the new church of St. Andrew, in course of erection at Stanley, was laid on the 19th ult., by Colonel Joicey. The parish of Beamish, for which the church is being built, was created in October, 1873, with the Rev. J. Crennell as incumbent. The church, which occupies a splendid site, is designed to hold 350 worshippers. It will consist of nave and chancel, north aisle, and organ chamber, forming a parallelogram measuring 96 ft. long by 42 ft. wide internally, with a south porch. The building is in the style prevalent in England in the fourteenth century.

Destructive Fire at Haslingden.—The large workshops belonging to Messrs. John Tattersall & Sons, joiners and builders, Haslingden, last week were discovered to be on fire, and in about two hours were a complete wreck.

Seats in the Streets of St. Pancras.—The contractor for supplying the public seats just fixed on various sites in St. Pancras is Mr. Lazarus, of Old-street. The seats may be described as 6 ft. in length, having in the middle and at each end a scroll arm, which admit of four persons sitting at ease, two in each division, the object of the arm in the middle being to prevent any one from occupying the length of the seat by lying down. The framework of the seats is constructed of wrought iron of double the usual thickness, the seat itself being formed of stout wooden laths, and the top back piece of stout elm, the woodwork being painted and grained oak and varnished, supported on iron scroll legs bolted into piles down in the ground.

A Big Figure.—Herr Ernst von Bandel, a Westphalian nobleman devoted to the sculptor's art, has executed a gigantic statue to Hermann, the vanquisher of Varus, in the Teutoburg Forest. According to German papers, the statue is of embossed copper, 100 ft. in height irrespective of pedestal, and has been wrought by the hand of the man whose brain created it. His whole life has been consumed in this one object. When he had done modelling—no small task in the case of a figure with hands 5 ft. long—he took to the hammer and forge, and literally formed the immense surface with his own unaided strength. A good deal of it was done at the foot of the hill whereon it stands, near Detmold, the capital of the principality of Lippe.

Falling in of a Roof.—The chimney of a dwelling-house at Emscote, Warwick, was recently blown down. In its fall it crushed in the roof. The *débris* fell into a bedroom, in which were two bedsteads, on one of which was sleeping Mr. Reading, the owner of the house, while his son slept on the other. On the son's bedstead fell a heap of bricks and slates, some of which inflicted very severe injuries on the young man, who was removed to the Warneford Hospital, where he lies in a precarious condition. For some time the chimney has been noticeable for its inclination; but no one seems to have supposed it was in quite so dangerous a state as the result has proved.

Memorial of Bishop Wilberforce.—A memorial chapel of the late Bishop Wilberforce, erected at the cost of nearly 6,000*l.*, was opened on the 25th ult. by the Bishop of Oxford, in the presence of the Bishop of Brechin, Bishop of Bloemfontein, and the Bishop of Nassau, about 300 clergy of the diocese, and a large number of ladies. The chapel is built adjoining the college of Cuddesdon, which was founded by Bishop Wilberforce, and is intended for the use of students. This was considered to be the most fitting memorial to the late Bishop, who desired to erect a chapel for the college.

The Proposed Widening of London Bridge.—At a meeting of the Common Council on the 27th ult., Mr. Stewart asked the chairman of the Bridge House Committee what progress had been made in regard to the proposal to widen London Bridge, and when the report of the committee on the subject would be presented to the Court? Mr. Rigby replied that the Bridge House Committee had given this question their most earnest attention, and at the present time their architect was consulting with an eminent engineer in regard to it. They hoped to be able soon to bring up a report on the matter.

Painters' Strike at Leek, Staffordshire. This unfortunate strike, which has been productive of much inconvenience and loss to all parties, was last week arbitrated upon by the Mayor of Hanley. The reference to him was taken at the Red Lion Inn, the masters being represented by Mr. Phillips and Mr. Johnson, and the men by Mr. Mason and Mr. Byrne. The award was received by Mr. Phillips on Saturday, and gives ½d. per hour advance on the old rate. This rule is to apply until May next. If any change is then proposed by either masters or men, a month's notice of the intended alteration to be given.

Art Loan Exhibition at Winchester.—On the 31st ult., Lord Selborne opened the Art Loan Exhibition at Winchester. The proceedings commenced with a *déjeûner* given by the Mayor at St. John's-rooms. At three o'clock the company proceeded to the Guildhall, where a number of the principal residents had assembled, and Lord Selborne declared the Exhibition open.

Re-opening of Wawne Church, Yorkshire.—The parish church of Wawne, near Beverley, which has been undergoing restoration, has been re-opened with special services. The stonework of the nave has been generally restored, and the building re-roofed, the interior re-seated with open seats, and a new pulpit added. The north porch has also been rebuilt. The cost has been about 1,400*l*. The chancel remains to be done, and other improvements made. Mr. Dennison, of York, was the contractor; Mr. Bannister, of Beverley, executing the stonework; and Mr. Cherry, of Beverley, the plumbing work.

The Tower of St. Antholin's.—At a meeting of the City Commissioners of Sewers on the 25th ult., Mr. W. Clark said he understood that the Vestry for the district of St. Antholin's had decided to pull down the tower of that church. At the union of the benefices, it was arranged that this tower, which was a great architectural ornament, should be allowed to stand, and he moved that the matter be referred to the Improvement Committee for consideration and report, and with power to take such steps as they might be advised to preserve the tower.

Completion of the New Reservoir, Pontefract.—The new reservoir, for storage purposes, to supply the town of Pontefract and district with water, erected in the Park, has now been completed by the contractor, Mr. Marsh, of Castleford. The defects in the construction of this reservoir during the first stages of its erection have been removed, and it is now considered to be water-tight. The tank will hold, when filled, 369,000 gallons of water, which will be forced from the present works in Tanshelf, and conveyed into the town through the pipes already laid down.

Enterprise in Turkey. — Two industrial undertakings are reported in a letter to the *Bassiret* to have been set on foot at Tirnovo, in Bulgaria. One is a blacking manufactory, which is already at work, and the other a soap manufactory, which will shortly be opened. This is satisfactory. It is something to know that enterprise is not yet quite extinct in Turkey. As the *Levant Herald* says,—"These undertakings will thrive, unless some over-zealous governor takes it into his head to tax all the profits out of them on behalf of the Government."

Tenders for Work, Bethnal-green.—The guardians have opened tenders for whitewashing, colour-washing, and the construction of a lift at the Workhouse, and for the erection of water-closets and lavatories at the Leytonstone School in accordance with specifications prepared by Mr. Mundy, surveyor. The offer of Messrs. King & Son for the carrying out of the required work at the Workhouse was accepted, and the tender of Messrs. Earl & Son for the execution of the work at Leytonstone Schools.

Kelly College, Tavistock.—On Saturday Mrs. Kelly, widow of the late Admiral Kelly, laid the memorial-stone of the new college (towards the establishment and endowment of which the Admiral left the sum of 80,000*l*.), in the presence of several thousands of spectators. The object of the institution is to afford a good education to the sons of poor naval officers at a small cost. The architect is Mr. C. F. Hansom, of Clifton, and the builder, Mr. John Pethick, of Plymouth.

The Gold Casket, presented by the Corporation of the city of London to H.I.M. Alexander II., Emperor of all the Russias, in connexion with his visit to the city of London, 18th of May, 1874, was executed, by order of the Corporation, by Mr. J. W. Benson, of Ludgate-hill and Old Bond-street. It is composed of gold and enamel, and is in the cinque-cento style. Mr. Benson has almost a monopoly of such commissions, and seems to have made up his mind to deserve it.

The Building Trade, Wolverhampton.—It has just been announced that Mr. Young, barrister, of the Oxford circuit, has unconditionally accepted the post of umpire to the Wolverhampton Building Trade Arbitration Board, owing to Mr. Rupert Kettle having retired. The master builders have acceded to the bricklayers a demand of ½d. per hour extra, rather than suffer the annoyance which would be occasioned by a strike.

The Way to Do it.—At a meeting of the Guardians of Winslow on Saturday last, Mr. R. W. Munday, of Buckingham, builder, was appointed Inspector of Nuisances, at 10*l*. per year.

The Demolition of Ancient Houses at Hackney.—Several very ancient houses at Hackney, full of historical interest and old associations, are in course of demolition. The King's Head Tavern, at Upper Clapton, which was a house of entertainment when Queen Elizabeth visited her favourite counsellor, Lord Hunsden, at the old house opposite, is being razed to the ground. The King's Head, in Mare-street, is also doomed.

Intermittent Downward Filtration.—We see by the public papers that there has been no opposition at the inquiries held by the Inspectors of the Local Government Board in the two cases of Hitchen (Herts) and Abingdon (Berks), in both of which it is intended to adopt the process of Intermittent Downward Filtration as recommended by Mr. Bailey Denton, C.E., for the disposal of the sewage of those towns.

Association of Engineering and Shipbuilding Draughtsmen.—The annual general meeting of this Association was held in the Religious Institution Rooms last week, Mr. D. Halley, president, in the chair. The annual report showed that the association was in a satisfactory state. Some modifications were made in the rules so that gentlemen engaged or interested in scientific pursuits might become associates.

Dereham Church.—The repair, by the Ecclesiastical Commissioners, of the parish church having involved a like reconstruction of the continuous roof between the chancel and the central or lantern tower, this has been recently completed by the Churchwardens. The work has been performed by Mr. Hubbard, builder, of this town, under the superintendence of Mr. Phipson, architect.

Small-pox.—A plague of small-pox of most malignant type has been desolating the town of Athenry during the last month. The terror of the surrounding district is a serious aggravation of the misery of the inhabitants. Nobody that can possibly avoid it will come near them. Business is at a deadlock, and there is dire distress among the population.

Marylebone Presbyterian Church.—The building in Upper George-street, Bryanston-square, which has been known under this name for thirty years, has been rebuilt and enlarged at a cost of about 15,000*l*., and now appears as a Gothic church, capable of containing 1,650 worshippers, with accommodation for Sunday-school classes, &c.

Landslip at Liverpool Pier.—A landslip took place at St. George's Pierhead, Liverpool, last week. A portion of the roadway, 20 ft. in diameter, which had been undermined by percolations, gave way suddenly and sank to a depth of 16 ft., causing a shivering sensation to on-lookers.

Glass superior to Marble.—A patent has been taken out for an invention by which it is claimed that glass can be used as a building material for house fronts, floors, or pavements, superior to marble in durability and economy. It may be made plain or variegated, and its colours are indestructible.

New Building Company, Middlesbrough. Among the new companies registered during the past week is one for the purpose of carrying on the usual business of a land, building, and investment company at Middlesbrough. The capital, 40,000*l*., is proposed to be raised in 10*l*. shares.

New Reservoir at Barnard Castle.—The tender of Mr. John Lee, of this town, for the construction of a storage reservoir, has been accepted by the Board of Health. Mr. Lee proposes to execute the works for 3,266*l*. Mr. Robinson, of Darlington, is the engineer. The undertaking was ordered by Government.

Pension to the Widow of Mr. Philip, the Sculptor.—The Queen has, on the recommendation of Mr. Disraeli, granted a pension of 100*l*. per annum to the widow of J. Bernie Philip, the sculptor, who died suddenly some weeks ago from bronchitis.

Sanitary Inspector, Halesworth. — Mr. Henry Mountain, of Darsham, builder, was on Monday last elected Inspector of Nuisances for the Westleton district, at a salary of 40*l*. per annum, in the room of Mr. James Rous, resigned. There were nine candidates.

Syston, Leicester.—A large clock, striking the hours and playing the Cambridge chimes, has just been placed in the parish church here. Mr. Smith, Midland Clock Works, Derby, has carried out the work.

Destruction by Fire of the Theatre Royal, Leeds.—About half-past ten o'clock on the 28th ult., the Theatre Royal, Leeds, took fire, and within about an hour was entirely destroyed, the fire engines having little effect in checking the progress of the flames.

Graveley.—The Bishop of Ely, on the 19th ult., re-opened the parish church of Graveley, Cambs, after partial restoration, at a cost of about 800*l*. The architect employed was Mr. Somers Clarke; and the builders were Messrs. Edey, Wildman, & Wade, of St. Neots.

A Congress of French Architects will be held from the 7th to the 12th of June next, inclusive, at the "École des Beaux-Arts." Several public buildings are to be visited.

TENDERS

For building a cottage, and alterations to house, at Triangle Farm, Plumpton, for Mr. D. Mutton. Mr. G. Tuppen, architect:—

W. & T. Garrett	£283 0 0
Botting (accepted)	255 0 0

All bricks found.

For house and studio, Steele's-road, Haverstock-hill, for Mr. C. E. Johnson. Messrs. Batterbury & Huxley, architects. Quantities supplied:—

Nightingale	£2,600 0 0
Newman & Mann	2,580 0 0
Grimwood & Son	2,455 0 0
Manley & Rogers	2,377 0 0
Linzell & Son (accepted)	2,293 0 0

For finishing four villa residences on the St. Helen's Estate, Hastings, for Mr. John Leach. Mr. L. Vernon, architect:—

Steel	£1,196 15 6
Vidler	1,146 0 0
Shortell	1,134 1 0
Champion	1,079 11 0

For building a new residence, coach-house, and stable, a pair of cottages, and a gardener's cottage, at Rochetts South Weald, for Mr. C. E. Coope, M.P. Mr. E. C. Lee, architect. Quantities supplied by Mr. L. C. Riddett:—

Scrivener & White	£3,406 0 0
Bayes & Rammage	3,323 0 0
Axford	3,105 0 0
Hammond	3,077 17 0

For enclosing an additional piece of land, Barking Side Church. Mr. W. G. Bartlett, architect:—

Drake	£136 0 0
Walter	120 0 0
Hammond	114 0 0

For building an addition to schools at Stanford-le-Hope. Mr. J. Brooks, architect:—

Hammond	£332 0 0
Crosley	319 0 0
Blake	277 0 0

For new infants' school and teacher's house at Marston Green, near Birmingham, for the School Board. Mr. John Cotton, architect. Quantities supplied:—

Chaffers	868 0 0
Davis	790 0 0
Hughes	715 0 0
Brooks	650 0 0
Davis, Brothers	645 0 0
Matthews	623 0 0
Widdowson & Lerrigo	577 0 0
Wheeler	528 0 0

For new parsonage at Little Hereford, near Fenbury, for Rev. L. Jones. Mr. John Cotton, architect. Quantities supplied:—

Bowers	£2,810 0 0
Goodman	2,627 0 0
Thompson	2,600 0 0
Grosvenor	2,593 0 0
Welsh	2,584 0 0
Pugh	2,508 0 0
Edwards	2,500 0 0
Collins & Cullis	2,316 0 0
Brazier & Weaver	2,190 0 0
Smith	2,055 0 0
Second List, after Revision of Plans.	
Collins & Cullis	£2,100 0 0
Brazier & Weaver	2,000 0 0
Smith	1,857 0 0

For the erection of eleven houses in Gordon-road, Peckham. Messrs. Berriman & Son, architects:—

Garland & Perkins	£4,340 0 0
Lingfield	4,123 0 0
Fisher	3,997 0 0
Prebble & Morley	3,650 0 0
Grummant	3,223 0 0
Faulkner (accepted)	3,135 0 0
Shapley	3,079 0 0
Wainwright	3,114 0 0
Monday	2,980 0 0

For new schools, for the School Board of Dartford, in St. Alban's-road, to accommodate 300 children. Mr. W. H. Powell, architect:—

Stevenson	£2,213 0 0
Waller	2,200 0 0
Melton	2,200 0 0
Kirk & Randall	2,075 0 0
Blake	2,050 0 0
Tongue	1,979 0 0
Naylor	1,890 0 0
Waller	1,850 0 0
Longley	1,840 0 0
Knight	1,830 0 0
Vicary	1,765 0 0
Sharp & Sons (accepted)	1,647 0 0
Spencer	1,597 0 0

For alterations to the "Marquis of Cornwallis," Bethnal-green-road, for Mr. J. Brown. Messrs. Hills & Fletcher, architects:—

Andrews	£656 10 0
Coleman	437 0 0
Craig	387 0 0

For alterations and additions to "Raymead," Hendon. Mr. Thomas Archer, architect:—

Davids (accepted)	£1,245 0 0

For new farm buildings, at "Eden," Beckenham, Kent, for Mr. C. A. R. Hoare. Mr. Archer, architect:—

Hooker (accepted)	£300 0 0

For additional stable buildings, and alterations to old stable buildings, at Kelsey Park, Beckenham, Kent, for Mr. C. A. R. Hoare. Mr. Archer, architect:—

Hooker (accepted)	£1,175 0 0

For alterations to the "Ben Jonson" public-house, Houndsditch, for Mrs. Moore. Mr. J. G. Needham, architect:—

Watson	£325 0 0
Palmer (accepted)	319 10 0
Balaam (too late)	297 0 0

For alterations to the "Duke of York," Caroline-street, Clapton, for Mr. Craufield. Mr. J. G. Needham, architect:—

Green	£351 0 0
Burton	235 0 0
Woodrow	220 0 0
Watson (accepted)	205 0 0

For restoring the foot-bridge and approaches, Mill Mead, Guildford, for the Urban Sanitary Authority. Mr. Henry Peak, architect:—

Pollard & Son	£165 0 0
Mason	163 0 0
W. Swayne, jun.	160 0 0
Garnett (accepted)	153 0 0

For a new farmhouse at Flexford, near Guildford. Mr. Henry Peak, architect:—

Nye (accepted)	£334 0 0

For alterations at No. 83, High-street, Guildford. Mr. Henry Peak, architect:—

Clark	£460 0 0
Garnett	451 10 0
W. Swayne, jun.	420 10 0
Mason	409 0 0
Strudwick (accepted)	403 0 0

Tender for farm buildings, &c., at Waterhall, Sussex. Mr. G. Tuppen, architect:—

Hill	£1,743 0 0
Patching & Webber	1,695 0 0
Dean	1,650 0 0
Miles	1,625 0 0
Colwell	1,600 0 0
Anscombe	1,565 0 0
Lockyer (accepted)	1,540 0 0
Parsons	1,438 0 0

For School Board Schools at Southwick, Sussex:—

Gehere	£2,140 0 0
Peskitt & Taylor	1,799 0 0
Bushby	1,786 0 0
Jarrett	1,785 0 0
Longley	1,685 0 0
Miles	1,650 0 0
Steer	1,610 0 0
Ockley	1,600 0 0
Bruton	1,585 0 0
Colwell	1,500 0 0
Wells & Mills	1,419 0 0

For proposed works at the Stamford Arms, Stamford-street, Blackfriars, for Mr. Thos. Parker. Messrs. Bird & Walters, architects:—

McLachlan & Son	£276 0 0
Williams & Son	265 0 0
Blott	225 0 0
Mills	218 0 0
Thompson & Smith	213 0 0
Mark	209 0 0

For proposed works at the East India-chambers, Leadenhall-street, for Mr. H. J. Solomon. Mr. Benj. Tabberer, architect:—

Crabb	£1,864 0 0
Mark	1,666 0 0
Cohen	1,645 0 0

For schools, teacher's residence, &c., Cove, near Tiverton. Mr. W. E. Williams, architect. Quantities by Mr. R. Carpenter:—

Roberts	£1,086 10 4
Hamlin	883 17 6
Cole, Willis, & Pratt	830 0 0
Dover, Son, & Co.	777 0 0
Barrows & Son (accepted)	764 0 0

For schools, residence, &c., at Edgewick, near Coventry. Mr. Arthur H. Byrd, architect. Quantities by Mr. R. Carpenter:—

Storer (accepted conditionally)	£1,975 0 0

For new studio for Mr. C. James, Prince's-street, Leicester-square, London. Messrs. Ingram & Hollands, architects:—

Axford	£221 0 0
Stephenson	209 0 0
Land	195 0 0

For rebuilding No. 487, Hackney-road, London, for Mr. J. Hill. Messrs. Ingram & Hollands, architects:—

Williamson (accepted)	£415 0 0

For new Wesleyan Chapel, Blackwell, Derbyshire. Mr. W. Ranger, architect:—

Forrest (accepted)	£1,675 0 0

For new Primitive Methodist Chapel, Havant, Hants. Mr. Ranger, architect:—

Ellis (accepted)	£398 10 0

For the renovation of the Free Church of England, Leamington. Mr. George Hart, architect:—

Mills	£220 0 0
Hodkisson	114 5 0
Brown & Son (accepted)	109 0 0

For the erection of new Board schools, with residence, &c., at Tyler's Green, High Wycombe, Bucks. Mr. Arthur Vernon, architect. Quantities by Messrs. Lamb & Church:—

Simmonds	£2,300 0 0
Traveno	2,270 0 0
Hook & Oldrey	2,170 0 0
Dover, Son, & Co.	2,151 0 0
Shurmur	2,124 0 0
Durley & Son	2,055 0 0
Reavell	2,042 0 0
Walker	1,996 0 0
Child	1,945 0 0
Hancock	1,930 15 0
Wheeler	1,910 3 1
Woodbridge	1,870 0 0
Sexton	1,793 0 0
Hunt	1,561 17 6

Alterations to "The Greyhound."—Mr. Impey says his tender was 269*l.* 10*s.*

TO CORRESPONDENTS.

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